

AGRICULTURAL

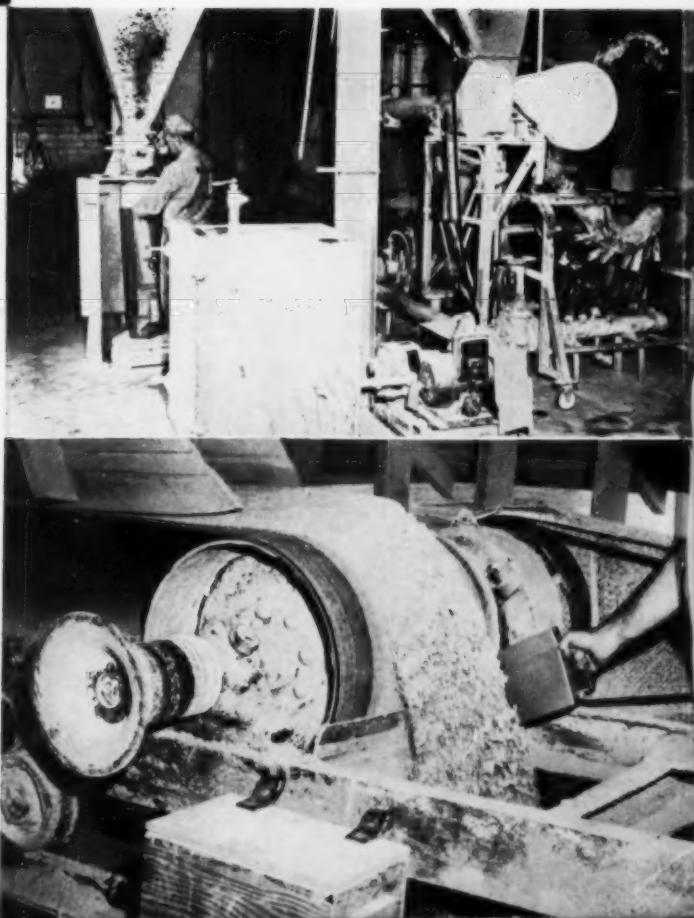
Chemicals

IN
THIS
ISSUE:

Niagara Division
Granular Pesticides For '60
Fertilizer Control Laboratory
Pesticide Symposium
Insecticide Production Report
Liquid Fertilizers

APPLICATOR SECTION

MAY, 1960



WANT ACTION ON YOUR CLAY ORDER?

**does it seem to rock along in one spot
when it should rocket along to your plant?**

To get your clay order out of the rut and into the groove . . . see a Magcobar sales-engineer. He'll take special care to assure that you get exactly what you want, where and when you want it.

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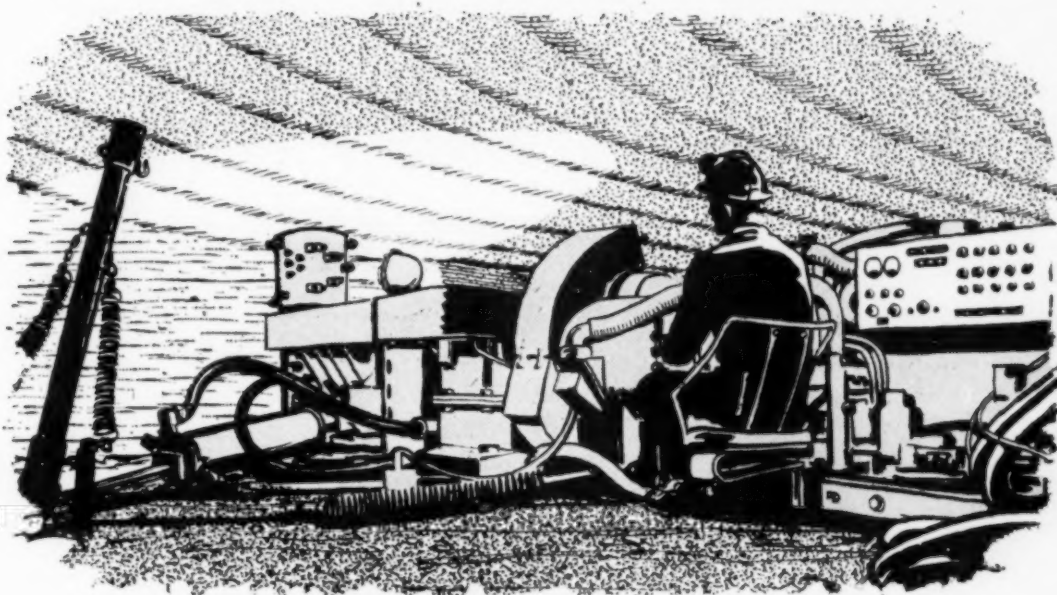
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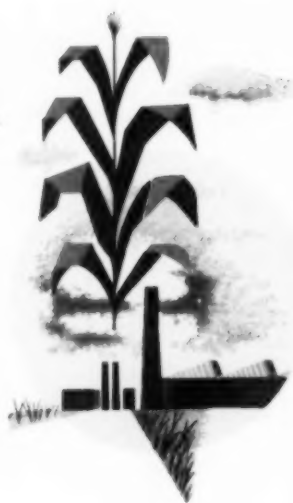
DIAZINON INSECTICIDE
Versatile effective organic phosphate insecticide for long residual fly control, multiple insect control on most fruit and vegetable crops. Extensively used by PCO industry for control of roaches and other household insects. May be formulated for household insect sprays.



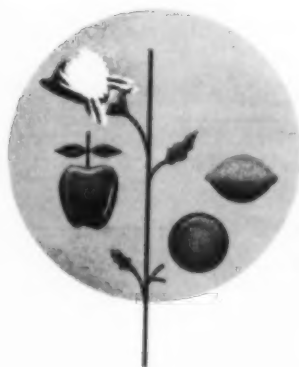
Geigy METHOXYCHLOR INSECTICIDE
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Pre-emergence herbicide for use on corn. One application gives season-long effective weed control. Safe to corn. Performs best in areas where rainfall is normally expected 10 to 14 days after planting. Also for pre-emergence use on nursery stock, and at higher levels of application, as an industrial herbicide. Extremely low toxicity to humans and animals.



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Safe, effective miticide for use on deciduous and citrus fruit, ornamentals and nursery stock. Long residual action.

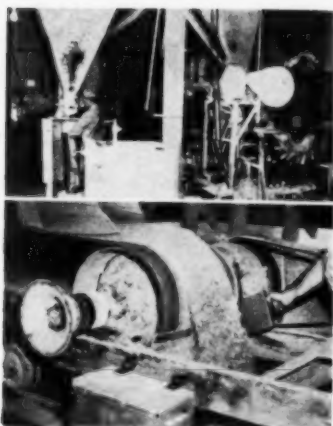


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ORIGINATORS OF DDT INSECTICIDES

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This Month's Cover

Top photo shows view of Kidwell Mill at Niagara Chemical's Middleport, N.Y. plant. See story on page 30.

Bottom photo shows special cup used to sample fertilizer as it drops from transfer belt just before packer. Story on quality control in the fertilizer plant on page 44.

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PUBLISHED monthly on the 1st, by Industry Publications, Inc.

ADVERTISING and Editorial Office, P. O. Box 31, Caldwell, New Jersey.

PUBLICATION Office: 123 Market Pl., Baltimore, Md.
ENTERED as second-class matter November 4, 1949
at the Post Office at Baltimore, Md., under the Act
of March 3, 1879.

SUBSCRIPTION RATES: United States, 1 year, \$3.00;
2 years, \$5.00. Canada and Pan American countries,

1 year, \$4.00; 2 years, \$7.00. All other foreign
countries, 1 year, \$9.00; 2 years, \$15.

SINGLE COPIES: current issue: \$0.50; all back num-
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APRIL MAY JUNE JULY AUGUST SEPT



NOW KILL MITES ANY TIME DURING THE SEASON

new Tedion® registration permits spring and summer applications on deciduous fruit

From bloom to harvest, deciduous fruit can now be protected against all varieties of mites as a result of new label claims permitting Tedion applications throughout the growing season. Included in the new registration are: apples, peaches, apricots, cherries, crabapples, grapes, nectarines, pears, plums, prunes, quinces.

Prior to this registration, Tedion, an exceptionally effective miticide, could be used only until petal fall on apples and pears, not later than split-shuck stage on cherries, peaches, plums and prunes.

The new regulations let you use Tedion

Tedion®

when mites are most serious. One application should be made after most over-wintering eggs have hatched to kill the early-appearing European red mite. A second treatment can be applied when fruit is present for control of summer mites—two-spotted spider, McDaniel, canadensis, carpini, Willamette and Pacific mites. These species hatch from eggs laid in fields and grasses and invade trees later in the season.

A highly specific miticide, Tedion fits in well with programs based on new broad-spectrum pesticides, which are ineffective against mites. Tedion kills mites in all stages—even resistant strains—but it is harmless to beneficial mite predators. Because of its unique chemical structure, Tedion is safer than most pesticides and provides long-lasting positive residual control.

TECHNICAL CHEMICALS DEPT., NIAGARA CHEMICAL DIVISION, FOOD MACHINERY AND CHEMICAL CORPORATION, MIDDLEPORT, N. Y.

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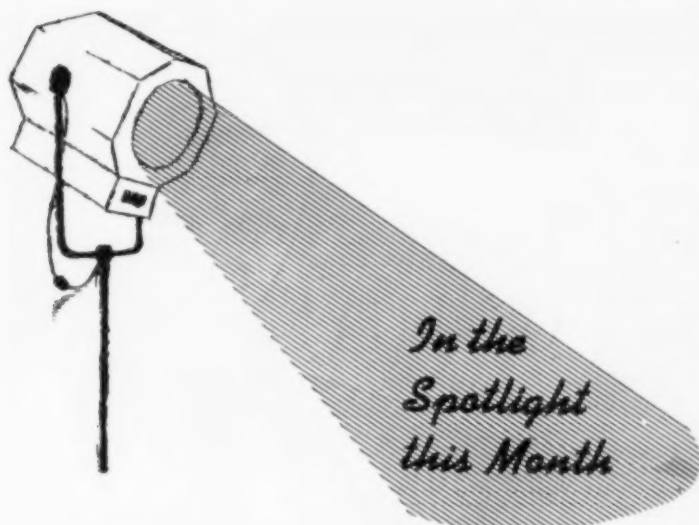
KRAFT BAG CORPORATION

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Daily News Building, Chicago 6, Ill.





- **Niagara Division . . .** A well known corporation in the farm supply field for over 75 years, Food Machinery & Chemical has become one of the best run companies in the industry during the past few years. FMC's Niagara Division, the division best known in the pesticide field, has been decentralized into three operating departments with 14 regional offices, an arrangement that has paid off in flexibility and profits. Page 30.
- **The Terre Co. . .** With the movement of city dwellers and industrial plants away from large cities, farms in suburban areas are on the decrease and, in many such areas, are non-existent. Also affected have been manufacturers of agricultural chemicals and equipment. The Terre Co. has survived the trend by tailoring its product to meet the requirements of new home owners. Page 34.
- **New Granular Pesticides . . .** Due to the tremendous amount of interest in granular pesticides on the part of farmers, many new formulations are available for the 1960 season. The largest number of granular herbicides are aimed at the corn-belt market while the impact of granular systemic insecticides is being felt in many parts of the country. Page 36.
- **'59 Insecticide Production . . .** Synthetic pesticide production for 1959 is expected to be higher than the '58 total of 539,396,000 pounds, and approach the 1956 record of 569,927,000 pounds. Dollar sales at the consumer level are estimated at about \$660 million dollars. Page 41.
- **Agricultural Applicator . . .** The use of chemicals for control of brush has become an established practice along rights-of-way, watersheds, roadsides, and elsewhere. Even the most versatile power equipment, however, cannot get over all kinds of terrain and the use of knapsack-type mist blowers for brush control along a pipeline right-of-way is described. Page 55.
- **Fertilizer Control Laboratories . . .** The lot of the fertilizer control laboratory, and the chemist in it, is not an easy one. The work is concerned with difficult to measure, bulk materials and variations in chemical composition before, during, and after processing in the fertilizer plant make comparative analyses difficult even with good sampling. Page 44.

MARKET REPORT

Potash Prices To Rise

At least one potash producer has announced a price increase for the 1960-61 fertilizer season. Increases, ranging from 3 to 3½ cents per unit K₂O have been set, returning listings to the approximate 1956-57 level. In addition, the June price differential will be eliminated in 1961 and the one per cent cash discount will be discontinued.

Although only one producer has issued a schedule, other major potash producers have indicated that they probably would support the new and higher prices. Rising labor and materials costs are cited to justify the price increases, which will boost muriate \$1.80 a ton, although the lack of potash output from Canada may be a factor.

The outlook for potash sales this season is complicated by the poor weather in the midwest this spring.

DDT Bids Made To GSA

Eight U. S. firms last month offered to supply the government with 28,538,000 pounds of 75 per cent wettable DDT powder at prices ranging from 21.72 cents to 25.95 cents a pound. Earlier the General Services Administration had invited bids for 13.5 million pounds of the insecticide which is to go to India under the World Health Organization's anti-malarial program. According to reliable sources, GSA hopes to purchase the material at less than 23 cents a pound.

Montrose Chemical of California recently sold 10 million pounds of 75 per cent wettable DDT to the United International Children's Emergency Fund at a price of 22.22 cents per pound.

Fair Trade Bill Tabled

A bill to let manufacturers fix retail prices for their products throughout the country was buried April 19 in the House Rules Committee. By a vote of 6 to 4 with two abstentions, the committee tabled the so-called National "Fair Trade" Bill.

Representative Richard Bolling, Democrat of Missouri, said, "It is a bad bill. It won't provide the relief for the little business men that they think it will, and it could be damaging to the economy." The measure had been supported by Representative Oren Harris, Democrat of Arkansas and chairman of the Commerce Committee. Under the bill, any manufacturer of branded merchandise could fix minimum retail prices by merely notifying his distributors.

Ammonia Capacity To Rise

Three firms have revealed plans to start construction of additional facilities for the production of synthetic ammonia. Dow Chemical will expand its Freeport, Tex., plant to 115,000 short tons per year of anhydrous ammonia, and also will build a plant at Plaquemine, La. Tennessee Corp. will put up a plant at East Tampa, Fla.; and Solar Nitrogen Chemicals will increase capacity at Lima, O.



Just Say



That's All

and get both automatically

Continuing research and development assure you of consistently fine quality. Continuing recognition of the industry's need for dependable deliveries assures you of consistently fine service—same day shipment.



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SULPHUR**

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Exclusive Sales Agent
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ATLANTA, GEORGIA

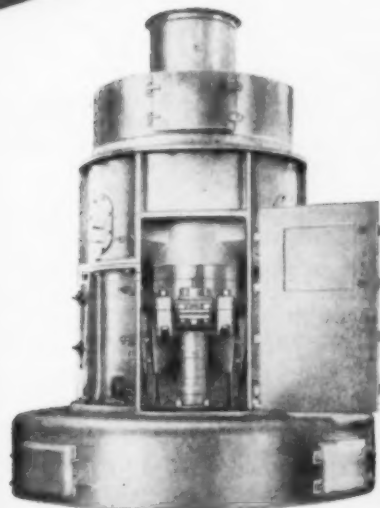
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*See Chemical Engineering Catalog or
for complete information, write for Catalog No. 63*



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dryer capacity, or a drier product. 5. Increased plant capacity. 6. Faster curing and quicker shipment. 7. Improved quality of both conventional and granular fertilizer.

In addition to these 7 advantages, you may find still other ways in which these unique DRI-SOL solutions can be useful to you. For example, these solutions can be used to help offset the high water content of lowstrength acid, or to produce those grades which are difficult or impossible to

make with conventional solutions. CSC's DRI-SOL Nitrogen Solutions are available in grades ranging from 24% ammonia and 76% ammonium nitrate to equal parts by weight of ammonia and ammonium nitrate. This new line of solutions is essentially anhydrous. Water content: about 0.5%.

DRI-SOL solutions are generally available in the Southern and Midwestern States. Technical literature available to fertilizer manufacturers.

AGRICULTURAL CHEMICALS DEPARTMENT

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★ Please send me technical data on CSC's new DRI-SOL Nitrogen Solutions. The solutions numbers I am currently using are: _____

The bulk of my mixed goods tonnage is made up in the following grades: _____

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MEETING CALENDAR

- June 9 — Executive Committee Meeting, Fertilizer Section, National Safety Council, College Inn Motor Lodge, Raleigh, N. C.
- June 12-15 — National Plant Food Institute, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.
- June 21-22 — Southern Feed & Fertilizer Control Officials, Riverside Hotel, Gatlinburg, Tenn.
- June 28-30 — Pacific Branch, Entomological Society of America, Davenport Hotel, Spokane, Wash.
- July 13-15 — Fertilizer Conf. of the Pacific Northwest, Hotel Utah, Salt Lake City.
- July 27-30 — Southwest Fertilizer Conf. and Grade Hearing, Galvez Hotel, Galveston, Tex.
- Aug. 10-11 — Northeast Regional Fertilizer Safety School, Park Sheraton Hotel, New York.
- Aug. 16-17 — Midwest Regional Fertilizer Safety School, National Safety Council Headquarters, Chicago.
- Aug. 25-27 — Southeast Regional Fertilizer Safety School, Wilmington, N. C.
- Aug. 28-31 — Soil Conservation Society of America, 15th annual meeting, Ontario Agricultural College, Guelph, Ontario, Canada.
- Sept. 11-14 — Canadian Agricultural Chemicals Association, Britannia Lodge, Muskoka, Ontario, Canada.
- Sept. 11-16 — American Chemical Society, 138th National Meeting, New York, N. Y.
- Sept. 12-14 — Entomology Society of Canada, 10th Annual Meeting with Entomology Society of Saskatchewan, Saskatoon, Saskatchewan.
- Sept. 24-26 — Western Agricultural Chemicals Association, 31st Annual Meeting, Palm Springs Riviera Hotel, Palm Springs, Calif.
- Sept. 27-29 — National Agricultural Chemicals Association, Annual Meeting, Del Coronado Hotel, Coronado, Calif.
- Sept. 29-30 — Northeast Fertilizer Conf., Hotel Hershey, Hershey, Pa.
- Oct. 5-6 — Southeast Fertilizer Conf., Atlanta Biltmore Hotel, Atlanta, Ga.
- Oct. 10-11 — Four-State Aerial Applicators Conf., Hotel Chinook, Yakima, Wash.
- Oct. 17-18 — Fertilizer Section, National Safety Congress, Chicago.
- Nov. 3-4 — Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.
- Nov. 13-15 — California Fertilizer Assn., del Coronado Hotel, Coronado, Calif.
- Dec. 5-7 — Carolinas-Virginia Pesticide Formulators Assn. annual meeting, Carolina Hotel, Pinehurst, N. C.



MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade uniform, coarse and granular Muriate of Potash (60% K₂O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

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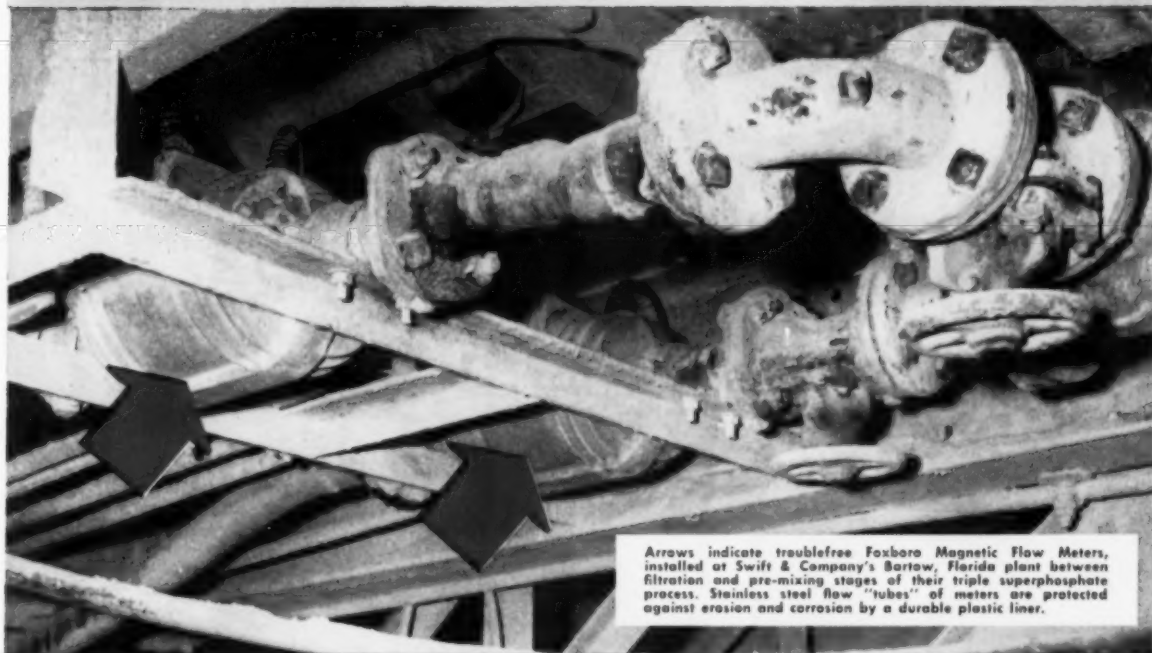
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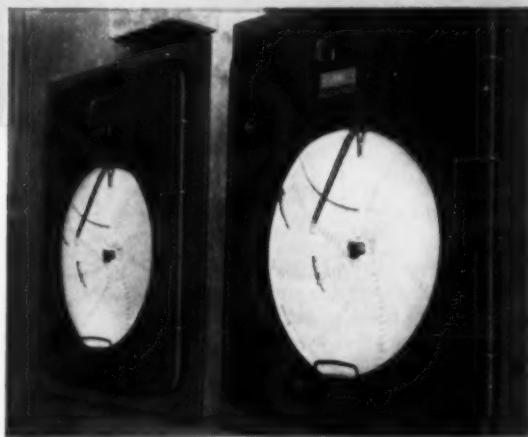
...by Foxboro Magnetic Flow Meters at **Swift & Company**

Measuring slurry is duck soup for two Foxboro Magnetic Flow Meters now used in the production of Swift & Company's Agricola plant food. Here's the story.

The company was shooting for uniform pre-mixing and quality control. Needed was an accurate means of measuring the flow of partially filtered phosphoric acid slurry. Orifice plates, or anything that restricted flow, eroded. Pressure taps quickly fouled. Even *purged*, long-cone Venturi tubes plugged! Solution? *Electrical* measurement with Foxboro Magnetic Flow Meters. Their smooth, pipe-like interiors simply *ignore* the suspended phosphate solids. There's no erosion, no fouling. Two flush-mounted electrodes "pick up" flow measurement . . . Foxboro Dynalog* instruments record it directly on a linear scale chart. And these records are accurate to 1% of full scale!

Find out exactly how the Foxboro Magnetic Flow Meter works . . . how it can efficiently and accurately meter the "impossible" in your plant. Write for Bulletin 20-14. The Foxboro Company, 135 Norfolk St., Foxboro, Mass., U.S.A.

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By watching slurry flow rates on Dynalog Recorder charts, operators precisely regulate feed of H_2SO_4 to the reactor tanks . . . permitting better quality control right down the line.

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"Jet-O-Mizing" produces FINE PARTICLES $\frac{1}{4}$ micron average and above PLUS . . . Narrow Particle Distribution • Dry, or Controlled Moisture Content • Continuous Operation • Uniformity of End Product • Other Operations with Grinding • No Attritional Heat—No Moving Parts • Low Operating Costs • Low Maintenance

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LETTERS to the EDITOR

TO THE EDITOR:

We are interested in antibiotics that are being used for control of leaf and root troubles, as found in ornamental plants.

If you will direct us to a source of information, we will appreciate your assistance.

S. Fikes
Ft. Worth Botanic Garden
Fort Worth, Texas

Among the suppliers of antibiotics for agriculture are Eli Lilly, Indianapolis; Chas. Pfizer, New York; Merck & Co., Rahway, N. J.

TO THE EDITOR:

I would appreciate it if you would give me the address of a concern selling Activated Charcoal in commercial quantities, as I could use it as a de-odorant in my Pest Control business.

R. H. Sammis
Daytona Beach, Fla.

Activated carbons are sold commercially by R. W. Greeff & Co., New York; Industrial Chemical Sales Corp., New York; and Barney-Cheney, Columbus, Ohio.

TO THE EDITOR:

I am desirous of starting up a small business in the Agricultural Chemicals line, and essentially would be a retail trade catering to home owners, gardeners, lawn keepers, golf green keepers, horticulturists, vegetable growers, citrus growers and so on, so naturally I would be interested in small convenient packaged items such as those appearing in pictures in your issues March 1958, May 1959 and others.

I would like to obtain information on what it would entail in making a comprehensive stock for such a business venture comprising various kinds of insecticides, fungicides, herbicides, etc. and the various firms that offer such items. I realize that this is a tall order, but it can safely be assumed that here in Jamaica are to be found similar diseases, pests and maladies that are to be found in other areas, hence many products available in the U.S.A. can be successfully used here too.

Lloyd H. Chang
Kingston, Jamaica, W. I.

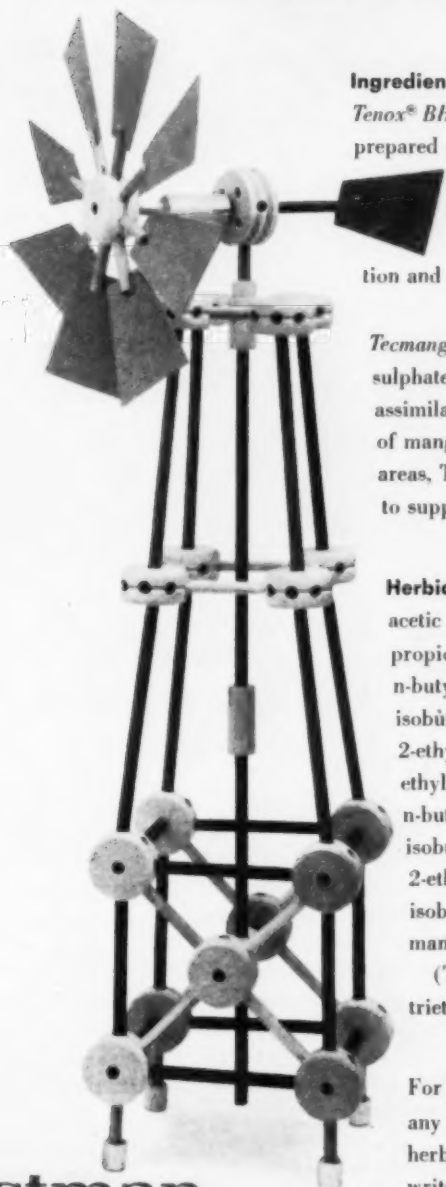
TO THE EDITOR:

Request permission to reprint "The Safe Handling of Pesticides", March issue, your publication, in official paper of Washington State Nurserymen's Association.

Hal Baker
Tacoma, Washington

AGRICULTURAL CHEMICALS

If you produce Herbicides Pesticides or Animal Feeds look to Eastman for these basic chemicals



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Tecmangam®. Contains 75-78% manganese sulphate. Completely soluble and readily assimilated, Tecmangam is an ideal source of manganese for feeds. In manganese-deficient areas, Tecmangam can be added to fertilizer to supply this essential element.

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propionic acid
n-butyric acid
isobutyric acid
2-ethylhexoic acid
ethyl alcohol
n-butyl alcohol
isobutyl alcohol
2-ethylhexyl alcohol
isobutyronitrile
manganese sulphate
(Tecmangam)
triethyl phosphate

For information, samples or specifications on any of these Eastman chemicals for use in herbicide, pesticide, and feed production, write to any of the sales offices listed below.

Eastman

CHEMICAL PRODUCTS, INC.

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SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; Atlanta; Chicago; Cincinnati; Cleveland; Detroit; Framingham, Mass.; Greensboro, N. C.; Houston; New York; Philadelphia; St. Louis. **West Coast:** Wilson Meyer Co., San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.



Single door, 5½ ft wide, barely slows the nimble Michigan as it hustles load of potash to elevator. To unload typical 50 ton boxcar takes one machine 1½ to 2 hours.

Smith-Douglass production manager reports:

"Michigans easy to operate, easy to maintain"

"Ease of maintenance . . . fatigue-reducing power steer . . . complete sealing against dust . . . these are the main reasons we bought our Michigan Tractor Shovels."

The speaker is Monroe C. Suderman, production manager of the Streator (Illinois) plant of Smith-Douglass Company Inc, Norfolk, Virginia.

Unload 50 ton boxcar in 1½ hours

One of this firm's many Michigan-equipped plants, the Streator operation uses their Michigans for a variety of material-handling assignments. Their Model 12B's—units with 3000 lb lift capacities and 16 cu ft buckets—spend about half their time moving potash, sulphate of ammonia, and triple super-phosphate from boxcars to elevators. Where travel distances are average (20

to 60 ft one-way) and car-loads typical (most materials are ordered in 50 ton lots), one Model 12B does a complete unloading job in 1½ to 2 hours. Bucket loads scale out at 800 to 1,000 lbs each.

Feed 25 tons TSP hourly

Another major 12B job involves feeding super-phosphate from storage piles to elevator. Unit output here, on one-way hauls of 25 to 250 ft, averages 25 tons per hour—all the plant can handle.

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around elevators. They haul re-work material. Push snow. Etc. Etc.

Versatility like this—*plus dependability*—are two of Michigan's *biggest advantages*. We'd like to show you, first-hand, how they can pay off *in your plant*. Choose from nine models, whatever size bucket you want (9 cubic feet to 10 cubic yards)—your Michigan Distributor will demonstrate. Call him to arrange time and place.

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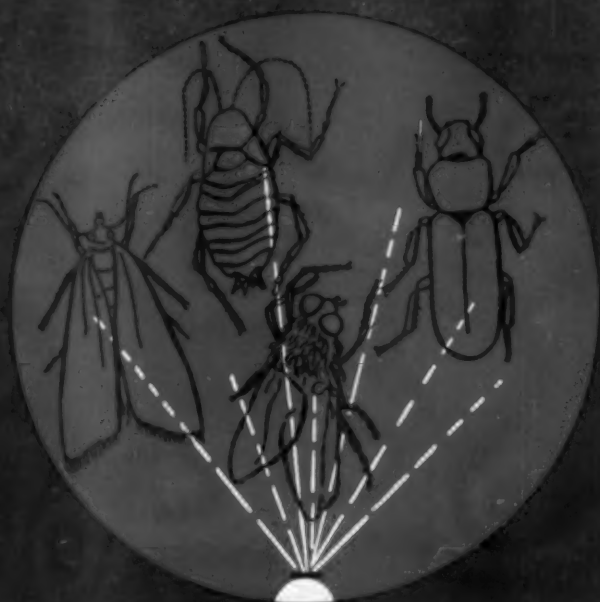
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Our new Pyrethrum and Pyronyl Concentrates in your aerosol will give the most deadly weapon available in the fight against industrial and household pests.

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P-3R

... And that *extra care* is just as real as the people who give it ... people like your customers ... people like your friends and neighbors—second and third generation people with the phosphate business literally bred into them working with Swift, the oldest phosphate operator in Florida.

Swift's extra care may very well offer you the opportunity to improve your customer satisfaction ... your plant operations ... and your profits. It's worth checking into! Have a Swift Phosphate Center Representative outline the advantages Swift offers you in phosphates—triple, rock or ground rock.

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 GROUND PHOSPHATE ROCK AND MINUTE MAN TRIPLE SUPERPHOSPHATE

MAY, 1960

23



Electron micrographs showing plate-like Micro-Cel E and spherical Micro-Cel B structures.

1μ

Micro-Cel is quite compatible!

Micro-Cel®, Johns-Manville's new synthetic calcium silicate, is chemically inert and is compatible with nearly all toxicants. Micro-Cel cuts shipping costs by permitting such high toxicant concentrations as 50% Heptachlor, 70% Toxaphene and 75% DDT. Micro-Cel's unique structural characteristics (surface areas up to 175 sq. m/gr) reduce caking, improve flowability, increase suspendability and extend shelf life. For further information, samples and technical assistance, mail in the coupon below!

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I am interested in using Micro-Cel with the following toxicants: _____

☐ Please send free sample of Micro-Cel.

☐ Please have your local Sales Engineer contact me.

Name _____ Position _____

Company _____

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City _____ Zone _____ County _____ State _____



Bo Weevil never had a chance against Frontier

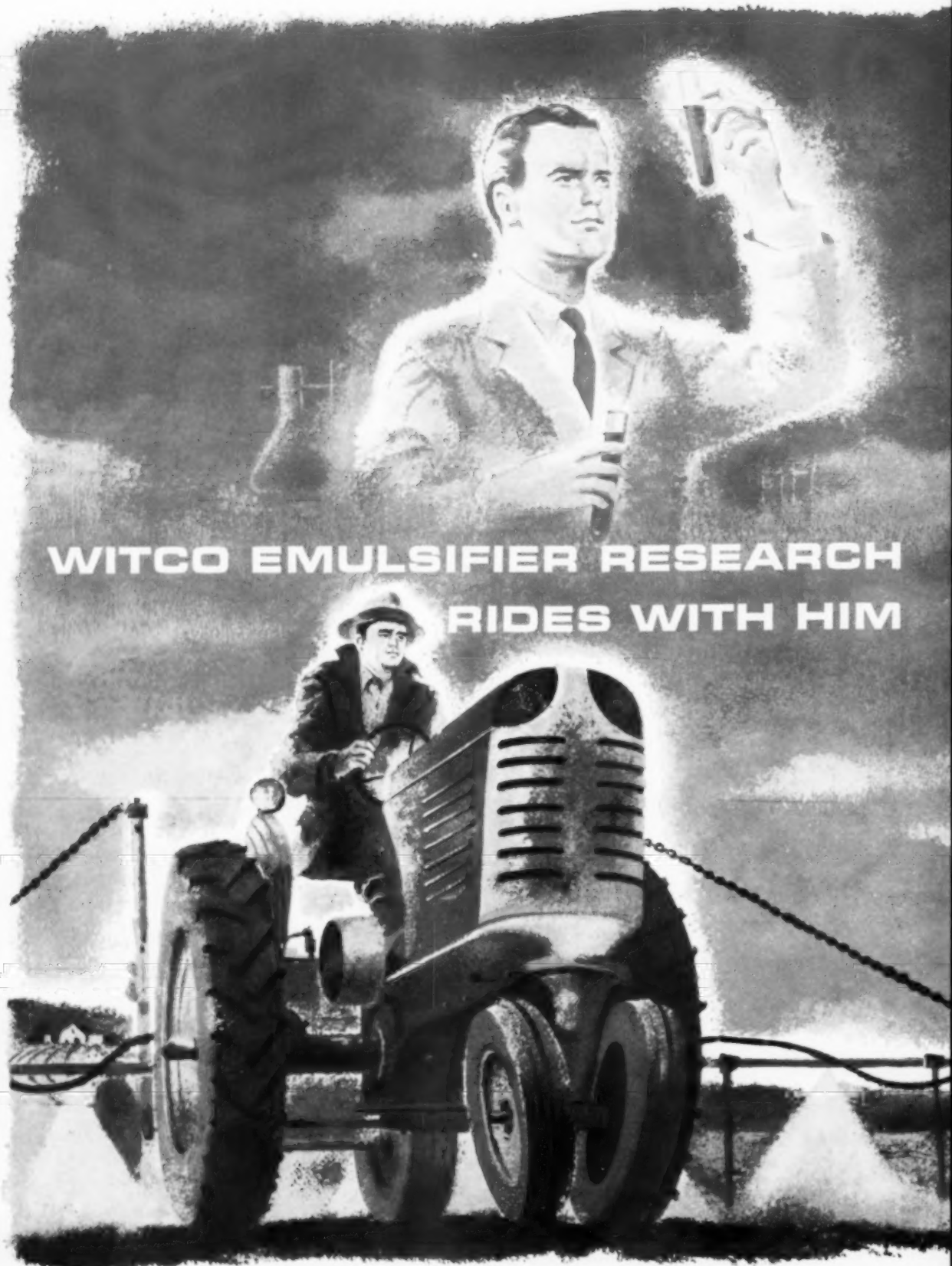
BHC

ANOTHER season brings the same old story — Bo Weevil meets his match in Frontier BHC. He never had a chance! For BHC, properly applied, is still the surest and most economical way to control weevil infestations in all stages of growth. It's the safest of all effective controls, too. And its residual effects last longer. Frontier BHC is offered in low gamma or high gamma concentrations, whichever you need. Both are produced under rigid quality control in Frontier's advanced new plant, and thoroughly seasoned to give you a product that's easy to work with. Be safe, be sure — contract for Frontier BHC.

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It's not yet Spring when Summer's work begins. Pre-emergence toxicants make possible an early start... a more profitable finish. And Witco research has created Witco Emcol Emulsifiers which perform outstandingly under the normal range of field temperatures. Formulators know how important this kind of performance is to sales.

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The many basic emulsifier patents held by Witco in more than 15 countries indicate the success of our research efforts in this ever-changing area of chemistry. Witco's technical service program makes available our extensive research facilities and highly trained specialists to help solve your formulating problems.

EMCOL	DESCRIPTION
H-300X	Emcol H-300X is balanced for toxicants in the lipophilic range (i.e., toxaphene and chlordane), while H-500X is ideal for more hydrophilic toxicants (i.e., DDT and BHC). Blends of this Emcol-matched pair produce superior emulsifiable concentrates with chlorinated hydrocarbon and organic phosphate insecticides.
H-500X	
H-710	Manufactured for use with 2,4-D and 2,4,5-T ester concentrates, at low levels, these products give low-foam concentrates outstanding emulsification and sludge-inhibiting properties.
H-712	
H-714	
H-140	Especially developed for use with Malathion, these Emcols may be blended with other Witco emulsifiers or used alone. H-140 produces excellent emulsifiable concentrates containing 5 pounds per gallon of Malathion (approx. 60% Malathion by weight). Emcol H-141 is recommended where levels of 8 pounds per gallon (approx. 86% Malathion by weight) are desired.
H-141	
H-A	These unique Emcols make practical simultaneous application of a wide variety of liquid fertilizers—liquid pesticide mixtures. Such mixtures may be field-blended to give exactly the correct proportions of toxicant and fertilizer as well as correct dosages for particular crops.
H-B	
H-C	



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*Like all the men and women in Cyanamid's phosphate operation,
his only business is phosphates for your mixed fertilizers.*

He's one of several hundred Cyanamid people who mine, process, research, deliver and service phosphatic materials for your acidulation and mixed fertilizer business. These people put Cyanamid's more than 40 years of phosphate experience into the kind of products and services you can use. Take advantage of both. Pick up your phone and call your Cyanamid representative.

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Traffic Service: Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money, make your operation run more efficiently.

Technical Service: Cyanamid's staff of technical experts are on 24-hour alert. Often, what are new problems to you are solved problems to them. Make your formulation and production problems theirs... that's their job.

Sales Service: Cyanamid sales representatives are available to work with you and for you in expanding present markets or in establishing and developing new markets.

Products that serve: Cyanamid's only phosphate business is mining and manufacturing the highest quality products for your mixed fertilizer requirements.

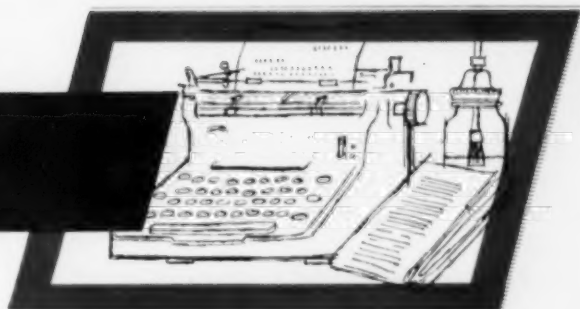
They are:

- Florida Natural Phosphate Rock
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*To manufacture fertilizers that sell... mix with Cyanamid's phosphates and service. American Cyanamid Company, Agricultural Division, New York 20, N. Y. *TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.*



EDITORIALS



SPRING and all its nostalgia is finally here, — bringing with it the crocuses, forsythia, cherry blossoms,— and on a more mundane level, a rush of orders for fertilizers and pesticides. The mail often includes a program or two for the many trade meetings, which multiply in number year after year.

The average pesticide formulator and fertilizer mixer receives such correspondence with mixed emotions: joy at being able to get out of the office after a hectic winter to renew his suntan — and golf — at some picturesque resort; and alarm that the old rat race of meeting after meeting is with him again.

That stock greeting — "When did you get in?" — is being hard pressed these days by the number two contender — "When are we going to do something about all the dozens of meetings in this industry?"

We have a feeling that this complaint is little more than a conversation piece; that the spokesmen have a very high regard for trade meetings and wouldn't miss them if they had the chance. It has been amply demonstrated that attendance at association functions, however tiring, is just as productive, perhaps more so, as spending the same time back at the plant. Agricultural chemicals manufacturers who learn to *make full use* of their trade associations, find that they really profit. The time they invest in committees and projects is paid back, with interest, by the valuable, practical, information they receive to help them solve their own problems. But there has to be a limit to the number of meetings one man can attend!

There's no use hoping that industry meetings will decrease in the years to come. The trend in recent years has been for small side groups

to branch out from parent associations, calling for separate committees, regional meetings, etc. The thoughtful executive might give some consideration to sharing the wealth of these con-

(Continued on Page 116)

* * * * *

BASIC figures on pesticides for the year '59-60 indicate that manufacturer's sales registered a 5% gain in 1959 as compared with the previous year. This was in spite of the fact that there was no spectacular outbreak of insect pests or plant diseases, — and we might add, in spite of the fact that pressure groups all over the country keep up a never-ending attack on pesticide usage.

We saw some other interesting figures, recently. The Soviet Union has a population which is greater by almost 33 million than that of the United States. However, in Soviet Russia, it takes ten times as many people as in the U. S. to man the farms, — 52 million, as against 5.8 million for the U. S.

With the modern farming aids such as fertilizers and pesticides employed so widely and so efficiently in the United States,—each American farmer can grow enough to feed himself and 30 others — with huge surpluses left over, while in Russia it takes ten men on the farm to grow enough to feed themselves and thirty more in the factories.

It is this big edge that we have in farming efficiency, which can be credited directly to our intelligent use of agricultural chemicals, that gives us our continued superiority over Russia. Those who attack our continued use of chemical aids to agriculture are striking at the very source of our power.★

FLEXIBILITY IS KEY TO SUCCESS OF REORGANIZED NIAGARA DIVISION

Food Machinery and Chemical Corp.'s Niagara Division has a unique way of doing business but its policies are based on a series of sound principles and practical basic management decisions. The major principle is the strong emphasis on satisfactory rate of return on dollar invested. If the rate is unsatisfactory, Niagara does something about it, or gets out.

A separate and distinct merchandising program is established for each product, and each program is based primarily on the performance characteristics of the material in question. Market saturation is achieved with a minimum amount of territorial overlapping, thus creating intensive sales promotion incentive on the part of formulators handling the new Niagara pesticides.

FOOD Machinery & Chemical is a corporate name well known in the farm supply field for over seventy-five years, and specifically in the agricultural chemical end of the business for the past fifteen years. Its Niagara Chemical Division is of course the division of the company best known in the pesticide field. With its various predecessor companies acquired by purchase over a period of years, Food Machinery might for a time have been considered a patch work agglomerate, but recent corporate reorganization, basic management studies and the imposition of complete overall

planning have turned FMC over the past few years into one of the best run companies in the industry.

So impressive, in fact, has been its increased corporate efficiency and its growth in sales total (\$343 million in '59) and profits, (\$20.5 million in '59) that FMC was recently selected by a distinguished panel of judges as the first winner of Chemical Week's "Kirkpatrick Award for Management Achievement."

We are concerned in this review primarily with the Niagara Chemical Division of the company since it is this division of Food Machinery that has company re-

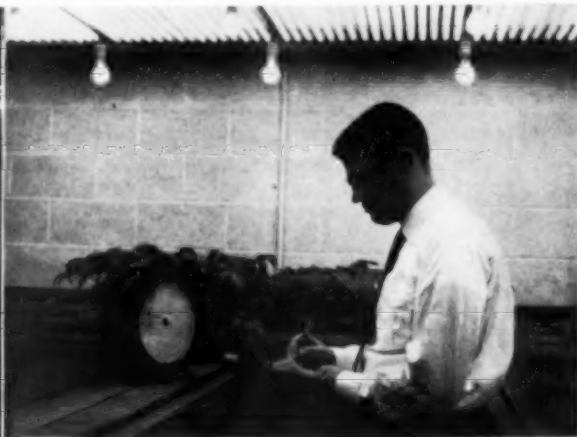
sponsibility for manufacture and sale of pesticide products. The Niagara division is headed by S. H. Baer as Division Manager. Stu Baer is a 1927 graduate of Penn State with a B. S. degree in horticulture. Most of the executive staff of Niagara division, incidentally, also have specific training in the agricultural chemical sciences as well as long experience in the pesticide field.

Mr. Baer has spent essentially all of his business life in the agricultural chemical industry. He joined Niagara in 1931 as a salesman in western New York, after three years experience as an or-

Plans in the making at Niagara Chemical Division are discussed by: (left to right) Stuart Baer, division manager; Dr. Robert L. Gates, director of research and development; Lloyd Coster, manager, technical chemicals dept.; and Edward K. Hertel, manager, agricultural dept.



Typical of Niagara's research facilities is this special chamber at the Middleport, New York, laboratories where sunlight, heat, moisture, and other pertinent weather conditions are simulated to find their effects on the action of various pesticides.





Scenes at Niagara's Middleport, New York, plant show (left) a Stokes & Smith Packer with Fry sealing machine employed



to pack Malathion 25 per cent wettable powder, and (right) a Raymond Mill grinding operation.

chard manager. He became successively territory manager for Illinois, district manager of the Midwest Area, assistant sales manager for the division in 1947, sales manager in 1952 and division manager in 1958.

The division includes three departments each operating completely independent of one another and of the parent company: The Agricultural Department which has the responsibility for manufacture and sale of all finished formulations (E. K. Hertel, Manager), the Technical Chemicals Department which has responsibility for sale of basic technical chemicals (L. R. Coster, Manager) and the Fairfield Chemicals Department responsible for manufacture and sale of concentrates involving pyrethrum and the synergist piperonyl butoxide (J. A. Rodda, Manager).

FMC's Niagara Division has, in an unusual industry, its own unique way of doing business—a method and a program that its competitors sometimes may feel is too unique, and perhaps difficult to understand. Its policies, however, are based on a series of sound principles and practical basic management decisions. First principle is the strong emphasis on satisfactory rate of return on dollar investment. If the rate is unsatisfactory, Niagara does something about it, or gets out.

Another basic tenet is a varied approach to the pesticide market. Niagara does business differently on different products, in different areas and on different types of crops. They sell basic toxicants to formulators, yet they also operate a group of their own formulating plants,—which, so far as Niagara's top management is concerned, may simply be thought of as another group of valued customers for the Technical Chemicals Department. The Agricultural Department in some areas may sell direct to growers, or they may sell through dealers or distributors. Where the per acre consumption of pesticides is relatively low, they recognize that they are not staffed to serve a market of this type, so they tend to use dealers or distributors to a greater extent.

Finally, they are willing to sell any type product in their field to any group of buyers where they can make a satisfactory return; and they try vigorously to avoid those products, lines or outlets where there is no money to be made. They are willing to admit they make occasional mistakes, but they change direction rapidly, get out of situations where they decide they don't belong, and minimize their losses. They put strong emphasis on high profit ratio products through intelligent incentive programs. In their organizational set-up and their sales philosophy

is much that could bear close study and imitation by others in this industry.

FOOD Machinery & Chemical Corp. first entered the agricultural chemical field in 1943 when they bought Niagara Sprayer & Chemical Co. for \$2,100,000. Niagara had for years been an important factor in the field of inorganic insecticides,—the arsenates, copper compounds, sulfur and nicotine. Their next acquisition was Coastal Chemical Co., Harlingen, Tex., which they bought in 1944. This firm operated a fertilizer business and also ground sulfur and formulated pesticides. It served as an entry into the big Texas market. In 1947 FMC bought a 50% interest, along with Michigan Chemical Corp., in the DDT plant at Pine Bluff, Ark., which had been operated previously by the U. S. Government. Subsequently FMC bought out the Michigan Chemical interest and changed the name of the company to Pine Bluff Chemical Co. This plant has since suspended operations.

In 1954 FMC made what has turned out to be an exceptionally profitable purchase when they took over Fairfield Chemicals from National Distillers. This gave them another group of pesticidal products to sell,—pyrethrum, Rotenone, various herbicides, repellents, and the well known and widely used

synergist, piperonyl butoxide. Their most recent acquisition was Sunland Industries, located in Fresno, California. Acquired in April, 1959, Sunland has since been merged into the Niagara organization, and in addition to providing a valuable facility in the rich San Joaquin Valley, has also given FMC a more direct interest in the fertilizer market. FMC continues to market fertilizer in the California area,—one of the purposes being to try to determine whether the addition of fertilizer to a broad pesticide line may be helpful in sustaining an adequate marketing organization.

It has only been within the past year or two that FMC has finally organized this series of corporate purchases into a well oriented and fully integrated unit. Much of the credit for the reorganizational plan, incidentally, must go to: Paul Davies, chairman of the board, whose original decision it was to take Food Machinery into the agricultural chemical business; Ernest Hart, president of FMC and well known in the ag chemical field as a past president of the National Agricultural Chemicals Association; Carl Prutton, executive vice president and present active operating head of the Chemical Divisions; W. N. Williams, vice president for manufacturing and engineering; and J.V. Vernon, vice president for marketing and distribution. Mr. Vernon served as president of the Niagara Division before he assumed his present post. He is currently president of the National Agricultural Chemicals Association. Assisting in the corporate planning and reorganization were McKinsey & Co., management consultants.

NIAGARA Sprayer & Chemical Co., FMC's first acquisition in the pesticide business, had been concerned primarily with inorganic pesticides, lead arsenate, calcium arsenate, Paris green, the fluorides, sulfur, bordeaux mixture, etc. The line of products changed drastically through the

late forties, as the organics replaced the inorganics. Facilities to manufacture DDT were acquired, as noted earlier, first at Pine Bluff, and later another plant at Carteret, N. J., when FMC absorbed Westvaco Chemical Co.

Just as dramatic a change has taken place over the past five years. Emphasis has switched from products like DDT and BHC,—staples of the insecticide business for a ten year period following World



Operator is drawing off 50 per cent dust base using a St. Regis Packer at the Middleport plant.

War II—to a new line of trade named pesticides, which are Niagara-controlled, patented, specialty products. The new line features half a dozen such products—the list including such names as Thiodan, Tedion, Niacide, Ethion, and Phostox. The DDT plants have been shut down, but Niagara still maintains a basic position as a supplier through a co-manufacturing arrangement with a producer.

Two of the new Niagara products, Thiodan and Tedion, were discovered abroad, Thiodan in Germany and Tedion in Holland. Niagara has acquired the American rights for both materials. Niacide is a fungicide developed in the United States by R. T. Vanderbilt Co. on which rights to manufacture and sell have been turned over to Niagara. The other new specialty products are the result of Niagara research. Candidates for future inclusion in the Niagara

line, still in the testing stage, include several new anilide herbicides which are said to be showing exceptional promise for use on cotton and tomatoes. Yet, while developing and testing a host of such promising new products, it is rather interesting to note, and perhaps characteristic of the Niagara operation, that they still make arsenates at Middleport, N. Y., emphasizing their willingness to make and sell any product in their field on which they can make a profit.

One of the branches of the pesticide business that Niagara decided to get out of,—in addition to the manufacture of DDT and BHC—was the small package market. If they were going to stay in the field, they felt, they would have to make a substantial additional investment in new facilities, larger staff, advertising and promotion of products, etc. Feeling that there were more attractive places to put company funds,—opportunities that figured to return a higher percentage on the investment,—Niagara decided simply to get out of the small package business. An additional factor in the decision was the feeling expressed by Carl Prutton, FMC executive vice-president, that "We don't know how to merchandise consumer goods. We'll leave the business to those who do."

They feel, with some justification, however, that they are qualified to operate efficiently their other departments which serve the pesticide field. One of the secrets of the success of the reorganized company, they believe, has been the establishment of a *decentralized* organization, with complete flexibility of approach to the market and a high degree of local responsibility,—factors which have been so important to local formulators in their competition with the "nationals" in the pesticide business.

When the Niagara Division was reorganized in 1958, it was decentralized into four operating departments (the three departments

named earlier and the retail department which has since been discontinued). The Agricultural Department was decentralized into seven regions, and this regional breakdown has since been further broken down to fourteen areas. About seventy-five per cent of domestic sales of pesticide products handled by Niagara consists of formulated goods sold by the 14 regional offices of the Agricultural Department. Each regional office is served by its own formulating plant and a local warehouse system.

Warehousing and maintenance of stocks has long been one of the most troublesome problems throughout the insecticide business. Being a seasonal business, with a large volume of finished products having to be formulated in advance and stored awaiting use when the growing season starts, an organization like Niagara's must use a wide range of channels of distribution and storage. Niagara utilizes public warehouses in many areas, and also maintains company owned warehouses in others, a practice which it favors. Where essential to efficient distribution, other company-controlled warehousing and distributing points are maintained. Reports on the exact status of stocks at all warehousing points are maintained on a week-to-week basis.

Under the decentralization program the fourteen regional managers have direct responsibility for all aspects of conduct of the business in their respective regions. This includes responsibility for manufacture, sales, administration, as well as adequacy of return on corporate investment, a point on which FMC is extremely sensitive.

TO a great extent the success of Niagara's sales program in recent years can be attributed to a sales incentive arrangement that recognizes and motivates maximum sales effort on the part of field sales representatives through incentive payments. This program also follows the general concept of

regional decentralization. The regional manager has responsibility under the program for meeting certain quotas on product types. In setting up the plan, field sales representatives participate in the establishment of the quotas through submission of estimates for their respective areas. Incentive payments are naturally commensurate with the success of the individual salesmen in meeting their quotas and in obtaining business



Stuart Bear, manager of the Niagara Division, joined FMC in 1931 as a salesman in western New York.

of the type which is most productive to the company.

Regional managers are also given goals to shoot at on amount of Inventory carried, and on Receivables outstanding. If they can succeed in keeping to a minimum the company's investment in Inventory and Receivables, this again becomes an important factor in judging the efficiency of the branch's operations. Profit and ratio of return on investment are the two important financial criteria which determine how efficient the regional manager is judged to be.

That this type of incentive program has paid off is well evidenced by the fact that corporate profit for '59, it is estimated, was about 30% higher than for '57, as a percentage of sales. And the sales total itself was up substantially.

The Technical Chemicals Department is the baby of the Niagara organization. Just two years old, it started operations in 1958

and was the major new operating unit set up when the Niagara division was reorganized.

Faced with the problem of how best to merchandise some of the new products that were being developed by the research department, several of which were right then in the final stages of testing, the Technical Chemicals Department was created to serve as the merchandising agency. FMC's top management reasoned that no single company could adequately exploit promising new products solely through its own outlets. In view of the comparatively rapid rate of product obsolescence in the pesticide field, the substantial investment involved in research and development, and the highly competitive market, management decided that the most efficient policy would be to prepare for marketing these new products through formulators generally, rather than to restrict them to sale just by the Niagara Agricultural Department.

The manager of the Technical Chemicals Department is charged with responsibility for obtaining prompt and thorough market penetration with all these new products. In achieving this end the Technical Chemicals Department utilizes a somewhat unique sales program. Obviously, all new materials are handled through the Agricultural Department on a national basis. Additionally an attempt is made to secure market saturation with a minimum number of merchandising outlets and a minimum amount of territorial overlapping. In this way an incentive is created for intensive sales promotion on the part of the formulator.

A separate and distinct merchandising program is established for each product, and the program is based primarily on the performance characteristics of the material in question. An attempt is made to utilize outlets currently enjoying a dominant position in the market serviced by the product. This

(Continued on Page 111)

A case history—

Terre Company, Totowa, N.J.

At one time fertilizer mixers for the truck garden market, Terre Co. shifted their production pattern and sales emphasis as the character of their market area changed . . . and today sell both pesticides and fertilizers to the home garden and other non-farm outlets.

Since housing developments and industrial centers have replaced farmland in north-

eastern New Jersey, Terre now puts most of its emphasis on high analysis fertilizer and specialty pesticide formulations to serve the home market.

They have found a growing demand for a larger number of specialized fertilizer and pesticide mixes among home gardeners, golf courses, highway departments, orchards, estates, etc.

AT the turn of the century, the movement away from the farms toward the cities was a source of much concern to farm owners who had large acreages on hand but who found themselves without adequate hired help. This trend now seems to have been reversed, with many people now leaving the cities for the more leisurely life of the suburbs. The farmers' predicament, however, has not improved. Although now there is adequate equipment to handle any size farm, the land, in areas adjacent to large cities, is being lost to housing developments and industrial centers. The only road open to the grower in many instances is to seek farmland farther away from urban areas (a not too difficult chore because of the high prices for which his land is being sold in suburban areas) or else change his way of life.

Mechanization, therefore, has been a mixed blessing to farmers in suburban areas. Although motorized tractors, sprayers, and harvesters have permitted the farmer to work more land with fewer people, the automobile has given the American people much more freedom of movement so that they no longer are obliged to live in the immediate area of their employment.

Also affected by this trend have been the firms which formulate and supply farmers with agricultural chemicals. Those which have been able to change their products so they can be sold to homeowners, however, are finding the non-farm market to be both profitable and expanding.

An extreme example of the change which is taking place in areas surrounding all large cities may be found in northeastern New Jersey, at one time a major truck farming area. The commuting distance from metropolitan New York now extends all the way to the Ramapo Mountains, some 30 miles west of New York. There are very few farms left in this area,

and thus, seemingly, very little market for agricultural chemicals.

There are, however, numerous survivors of this trend away from farming. The Terre Company of Rochelle Park and Totowa, N. J., is one of the healthiest survivors. Terre's main business used to be the supplying of large farms with agricultural chemicals, but they always have offered some agricultural and home garden specialty products. The change in production, therefore, to meet the increasing specialty market of homeowners, has not necessitated a severe shift of emphasis. Officials of the company, as a matter of fact, are unable to say exactly when the majority of their sales

An operator at the Terre plant in Totowa, N. J., prepares ingredients for mixing operations. Among the blending equipment at the plant, partially shown in background, is a Howe auger-fed ribbon blender with elevators and an Entoleter.



Farm Supplier Prospers With Sales to Homeowners

ceased to go to farmers and went instead to non-farm users of agricultural chemicals. The change has been gradual and Terre has gone along with it.

Three decades ago, for instance, Terre sold some 5,000 tons of fertilizer per year to farmers. Sales to farmers now are way down, but Terre still supplies a substantial amount of bulk fertilizers to such users as golf courses, turnpikes, and parks.

For the home garden market, Terre now is packaging fertilizers in bags ranging in size from five pounds to 80 pounds and insecticides are packed in quantities as low as four ounces. Other materials offered to home gardeners are lawn seeds—a major Terre product—and lawn herbicides.

A major difference that has taken place at Terre in recent years is the emphasis on higher analysis of formulations for the home market and the number of different formulations now needed for each product. Homeowners, Terre points out, want special fertilizers for each type of plant they grow. The Terre fertilizer line, for instance, includes: Lawnspar, Organo Rose Food, Rodo Gro Broad Leaf Fertilizer, Gardenspur, and Grountone, to name a few.

The company also formulates a wide variety of pesticide dusts.

Among the manufacturers whose products Terre uses in blending operations are American Cyanamid, Niagara, Geigy, Du Pont, General Chemical, and Stauffer. The blending operations at the Totowa plant are accomplished with a one-ton Howe auger-fed ribbon blender with elevators that feed the materials through rotary screens to an Entoleter which provides for an extremely intimate mix. A Howe blender also is used to mix grass seeds. Its one-ton capacity is supplemented by additional box hoppers. Besides the standard packaging equipment, Terre recently installed a Mateer small packaging machine.

Roy Bossolt, Terre sales manager, described the Entoleter as a blender in itself. Dusts are fed into the center of two fast-spinning metal discs, held apart with metal studs, he said, and the materials are "swooshed through these spinning baffles giving a very intimate mixture." Although the Entoleter is used in conjunction with the Howe Blender at Terre, Mr. Bossolt pointed out that it is possible to feed the pesticide ingredients directly into an Entoleter by conveyor belts that meter the desired portions of each material. In this type of operation, he said, the Entoleter is the sole blending machine.

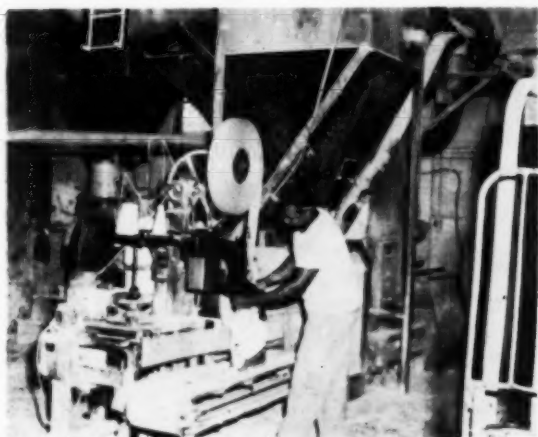
For storage in the Terre plant, everything is palletized and two lift trucks can unload 20 tons in ten minutes. Terre owns four trucks and leases six others with which to make deliveries throughout northeastern New Jersey and parts of southeastern New York.

Terre works with approximately 1,000 dealers and, also, services about 150 golf courses and parks. The company also deals with contractors for special jobs, such as highway building. This emphasis on lawn growth and care has resulted in 50 per cent of Terre's volume being devoted to seeds. The Garden State Parkway, for instance, has used almost 500,000 pounds of Terre seed on 3,403 acres of turf. Other users of varying quantities of Terre seeds include: The New York and Maine Thruways, the St. Lawrence Seaway, the Connecticut and New Jersey Turnpikes, and several raceways.

The important job in marketing home and garden products, according to Terre, is gaining consumer acceptance. This is one reason for the wide varieties of seeds, fertilizers, and pesticides offered. Homeowners, in general, know nothing about what product to use or how to use it and are at the mercy of the dealer to whom they go for advice. In many instances they end up with an inexpensive but poor-quality product that does not produce the results they have been led to expect. This is not always the fault of the dealer, because many of them have little or no previous experience with agricultural chemicals, which are being sold over supermarket, drugstore, and hardware counters in increasingly greater amounts.

In an effort to overcome this, Terre offers a soil testing service, encouraging dealers and professional grounds keepers to send in

(Continued on Page 105)



Operator runs bagged material through bag closure machine at finish of blending operation. Manufacturers supplying pesticides to Terre include: American Cyanamid, Niagara, Geigy, General Chemical, Du Pont, and Stauffer.

GRANULAR PESTICIDES FOR 1960

This year the impact of granular systemic insecticides is being felt in many parts of the country for the first time. Grower interest this season in Southern California for instance was such that considerable quantities of Thimet granules were "air lifted" to the scene.

The largest number of new granular herbicides are aimed at the corn-belt market, following last season's rising tide of interest in and use by mid-west farmers of pre-emergence herbicide granules. Other crops to be treated include; beans, peas, and peanuts.

DUE to the tremendous amount of interest in granular pesticides on the part of farmers throughout the country, many new formulations will be available this 1960 season. In securing background information for this article, most of the basic pesticide producers were contacted regarding their marketing plans. Some products are being held up due to lack of label approval at this time.

Herbicide Granules

THE largest number of new granular herbicides are aimed at the corn-belt market. Last season saw a rising tide of interest in and use by mid-west farmers of pre-emergence herbicide granules. This interest is borne out in any farmer meeting that one might attend.

On corn, the following new granular pre-emergence herbicides will be offered: Atrazine, 8%

(Geigy); Dow Premerge Granules, 10%; Randox T, 35% (Monsanto); Weedone LV 4 granular, 20% (Amchem Products); Esteron 99 Granules, 20% (2,4-D) (Dow); Monsanto 2,4-D Granular Weed Killer, 20%; Crop Rider 10% Terra Granular (Diamond Alkali); and Vegadex, 20% (Monsanto).

On soybeans, Alanap 10% granules will be formulated by Pennsalt, California Spray Chemical, Niagara Chemical and Thompson-Hayward. Dow Premerge Granules, 10% will also be available for use on soybeans.

In addition to corn and soybeans, Dow's Premerge Granules are registered for use on lima beans, snap beans, navy (pea) beans, red kidney beans, peas, peanuts and certain horticultural crops.

While Monsanto had Randox 20% granules available to growers in Illinois last year, only small quantities were released for other areas. This year they will be generally available and are registered for use on corn (hybrid sweet, field, sweet and pop); sorghum (grain, forage, but not seed producing fields); beans (east of Rocky Mts.); soybeans; lima and snapbeans; onions and cabbage (Wisconsin and Florida).

A glance at Table I shows a range of concentration of product from 8% to 35%, while the a-

Table I. Granular Pre-emergence Herbicides for use on Corn

Product	Concentration	Screen mesh	Application rate per acre		Manufacturer
			14" band (40" rows)	broad-cast	
1. Atrazine	8%	15/30	9-15#	—	Geigy
2. Premerge granules	10%	24/48	20-30#	60-90#	Dow
3. Randox	20%	20/35	7#	20#	Monsanto
4. Randox T	35%	20/35	10#	30#	Monsanto
5. Weedone LV 4 granular	20%	24/48	3½#	10#	Amchem
6. Crop Rider 20% Terra granules (2,4-D)	20%	20/40	3½#	10#	Diamond Alkali
7. Esteron 99 granules (2,4-D)	20%	24/48	3½#	10#	Dow
8. Monsanto 2,4-D granules	20%	20/40	3½#	10#	Monsanto
9. Weed-Rhap 20 (2,4-D)	20%	21/48	3½#	10#	Reaser-Hill
10. Crop Rider 10% Terra granules (2,4-D)	10%	20/40	7	20	Diamond Alkali
11. Vegadex	20%	20/35	10	30	Monsanto

mount per acre recommended on the 14-inch band varies from $3\frac{1}{2}$ to 30 lbs. per acre, depending upon product, soil type and other factors. One of the questions currently under discussion is "what is the optimum concentration of granules? Higher concentrates cost less per unit to ship, and should be more economical for the end user. Hoppers for granular row crop applicators are limited in capacity, since this is an auxiliary part of the parent machine; because of planter design, it is very important not to overload it, or to disturb the center of gravity. Physical and chemical natures of pesticides involved also have a bearing on product concentration, but regardless of concentration, uniformity of application is necessary for proper results. If very low rates per acre are recommended, farmer applications become more complicated and application mistakes are magnified.

Screen mesh size is another debatable question, with no one having all the answers at this time. How many granules per square foot are needed for best results under actual field conditions? Part of our answer here lies in physical and chemical properties of the pesticide itself. With more volatile materials, and with those with a good degree of water solubility, extreme accuracy of pattern is probably not quite as essential as with those which do not have these characteristics. Where possible, standardization of screen mesh size in the trade would be highly desirable from the standpoint of the end user (less confusion, easier to calibrate, better field results); while the formulator would have fewer screen mesh size granular diluents to inventory. In Table I, a rather wide range of screen mesh sizes is shown, ranging from 15/30, which is fairly coarse, through 20/35, 20/40, and 24/48. In Table II calculations are given for estimated number of particles per pound for certain screen mesh sizes.

Table II. Estimated number particles per pound for certain screen mesh sizes*

Screen mesh size		number particles per pound*
15/30	—	1,150,000
16/30	—	1,200,000
20/35	—	3,009,000
20/40	—	3,000,000
24/48	—	7,722,000

(Above adapted from information given by Minerals & Chemicals Company and Floridin Company.) *Results will vary with method of measurement. Inclusion of dust or too fine fractions increase amounts shown greatly.

Insecticide Granules

THIS year the impact of granular systemic insecticides is being felt in many parts of the country for the first time. Early season activity began in mid-January in Southern California's Imperial Valley with the use of Thimet and Di-Syston granules on sugar beets. Grower interest was such that considerable quantities of Thimet were "air lifted" to the scene of operations. Urgent need for granular applicators caused many of them to follow the same route. Applications of granules were also made to sugar beet seed producing areas of California. Formulations used in both situations were 5% granules. The application of granules to sugar beet foliage is slightly different from normal uses associated with a granular systemic material. In this situation, granules were directed to the crown and adjacent plant parts, with insecti-

cide action being somewhat systemic in nature, but also providing contact and fumigation activity.

In Arizona and California, applications of Thimet 10% granules to cantaloupes under experimental label have been made to small acreages. Similar work is being carried on in California on cotton. Other approved label uses for Thimet 10% granules include: potatoes, sugar beets, alfalfa and peanuts (Thimet for peanuts in Alabama only this year). All of these applications are at planting, with granules being placed to one side of, or underneath the seed — depending upon the crop. Di-Syston granules have given results comparable to Thimet on potatoes, but label clearance for this use at present has not been granted. Di-Syston 10% granules have been registered for use on cotton at planting, and also for alfalfa and lilies.

Potatoes

COMMERCIAL-SCALE use of granular Thimet on potatoes at planting was demonstrated in several states this past year. Results from Michigan and Wisconsin were especially promising, but adequate benefits were also demonstrated in many other areas to justify adoption of this program. In Wisconsin's northern potato area, 6-spotted leaf hopper, chieft vector of aster yellows and purple top viruses, was readily controlled for periods up to 100 days after

by Charles Starker

Sales Promotion Director
and Entomologist
Gandy Company,
Owatonna, Minnesota

Mr. Starker has been with Gandy Co. since Dec. 1958. His previous experience includes 11 years as a research entomologist.



one application of Thimet granules at planting. Other potato pests — potato leaf hopper, potato aphid, green peach aphid, and potato flea beetle were also controlled. In areas where Thimet had been used, a 30% to 60% increase in good tubers due to reduction in potato scab infection was noted, which may be due to reduction of potato flea beetle feeding injury.

Repeated application of chemical sprays with heavy spray equipment requires considerable labor, and causes mechanical compaction in the field. This program however, has been needed in Wisconsin until recently, in order to adequately control purple top. Now, Thimet granules applied with a precision granular applicator (see Figure 1), are the most effective and safest way to combat purple top, and have overcome the disadvantages of the spray program. (Some spray applications will still be needed for protection against early and late blight).

Potato plants are most susceptible to virus infection early in the season. Protection is now af-

forded by Thimet granules, which are present in high concentrations at this time, and give constant and uniform control, as compared with surface foliage applications of conventional spray materials. The latter give good control for a few days after application, at which time the effect drops off sharply because of exposure to the elements, and because the spray material is diluted by the rapid expansion of plant foliage areas. A systemic is generally localized in tender, green, rapidly growing plant areas — the precise portion of the plant where many plant disease-carrying insects normally feed. When the chief problem is one of virus-vector control, a high concentration of effective insecticide on or in the plant at all times is essential during the period of possible danger of infection. This job is done very adequately in most instances with granular systemics. Granular formulations of phosphate materials are safer for the user to handle than conventional spray materials, and offer exposure on a one-time basis. These materials do not interfere with bio-

logical control agents, because the chemical is active only against plant-feeding pests.

In treated areas of Wisconsin, the increase in #1 potatoes with the use of Thimet granules has ranged from 20% to 60% or more. Workers there feel this is the most economical program yet developed for insect control on potatoes.

Onions

IN a previous article* mention was made of the use of granular phosphate insecticides applied to onions in the row at seeding time in many areas of the country. Three new granular insecticide formulations will be released for use against resistant onion maggots this year. Ethion 5% with Thiram 8% (Niagara) provides a combination insecticide — fungicide treatment; while VC — 13 5% and VC — 13 20% granules (Pennsalt) are insecticides. It is interesting to note the rapid adaptation of modern farmers and growers to new methods. In Michigan, for example, it has been reported that at least two-thirds of the 9,000 acres of onions were treated with in-row applications of granular phosphate insecticides at planting last year. Growers were well pleased with this program.

Growing Pains

ANY field which is moving ahead rapidly is bound to have certain difficulties in development, marketing and end use of product. Granular pesticides are no exception to this rule. Containers are one area where additional work might profitably be done. Due to the extreme flowability of granules, and in many cases their potency, a sturdy, puncture-proof container is highly desirable. A small hole can release rather large quantities of granules in shipment. This may result in simple loss of product, or in contamination of other goods as well. One company packs their

(Continued on Page 104)

Gandy granular chemical row crop applicator, Model 901-4 mounted on 2-row Oliver Iron-Age potato planter. Two delivery tubes go to each row, right

behind the disc openers. This places the Thimet granules on either side of the seed piece, in approximately the same area as the fertilizer band



*The Use of Granular Chemicals in 1959, *Agricultural Chemicals*, November, 1959.

LIQUIDS LEAD TO SUCCESS STORY

by Homer Hathaway
Everett, Washington

Farmers have accepted the use of liquid fertilizer very well and formulators can profitably treat even small acreages. In custom formulation, especially where it is necessary to mix in minor elements, liquid formulations minimize blending problems.

"LIQUIDS will do everything that bulk dry will do, — and do a better, and cheaper, job for the grower."

If the farm chemical philosophy of Washington Co-op Farmers Association, could be summed up in one short paragraph, this is it,

according to Mr. Burl Wyckoff, Fertilizer and Farm Chemical Department manager.

"We do not discount the value of dry fertilizers, since we handle them at all of our outlets, but we do believe that liquid fertilizer can do any job for the grower that bulk can do, regardless of the size area treated."

Now if this sounds a little far-fetched to dealers who concentrate largely on bulk and dry operations, Mr. Wyckoff has some very convincing arguments to back up his statement.

Washington Co-op, with its main offices in Seattle, started into liquids just five years ago and the growth has been tremendous.

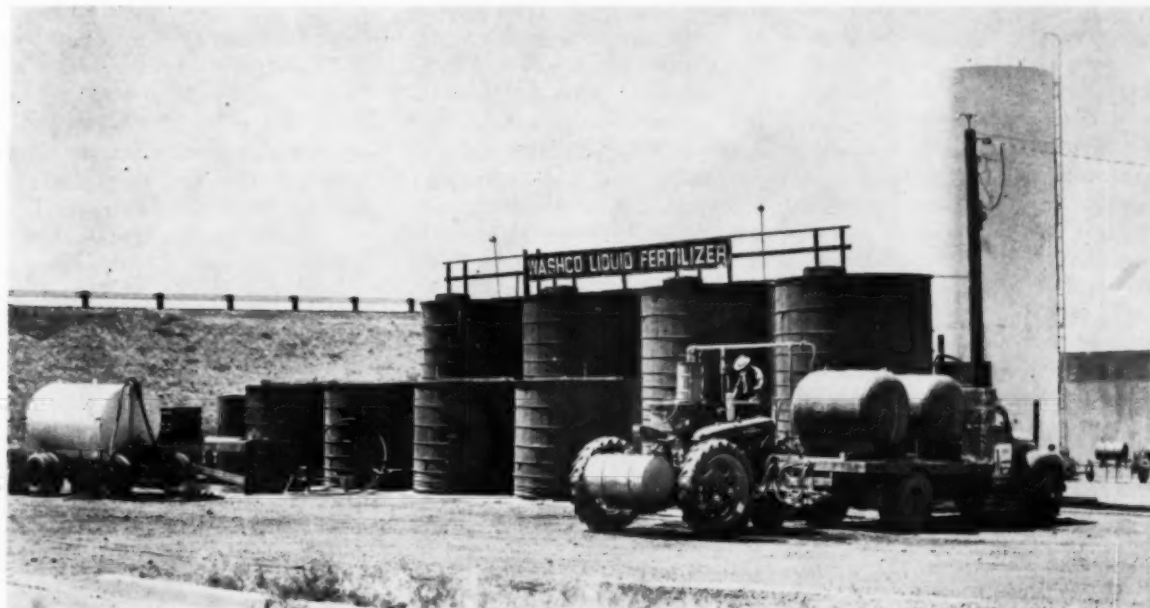
"The farmers have accepted the use of liquid fertilizer very well, and we have found that a small acreage can be treated profitably. We have also found that we can give a complete mixed fertilizer in liquid which remains competitive to dry mixes. We can put $2\frac{1}{2}$ tons of liquids through our

blending operations at a lower cost than putting through one ton of dry mix. In custom formulation, especially where it is necessary to mix in minor elements, we find that liquid formulations present few problems."

Since the company formulates over 200 different custom formulas during the year, the views expressed carry considerable weight.

"We will mix exactly what the customer needs, because in liquids we are not confined to a predetermined mix, and it takes only about 15 minutes to turn out the product desired. Liquids have definitely put themselves in a top position, especially in the field of custom application.

"With the high cost of farm labor, the grower has found, in most cases, that it is cheaper to have a custom application job done for him, or to rent the equipment and do it himself, rather than have a laborer brought in to do the work." Both kinds of service are available from the Wash-





Washington Co-Op has application equipment available for rental by the grower or will apply the liquid fertil-

izer itself on a custom basis. They also assist the farmer with soil samples and planning his fertilizer program.

ington Co-Op, custom application or equipment rental.

The organization has some 50 outlets, servicing farmers in three states (Washington, parts of Oregon, and Idaho). Liquid fertilizer is available at 11 of these outlets, with dry fertilizer available at all of them. The organization does not do any actual manufacturing of dry fertilizer. As Mr. Wyckoff put it: "We find it to our advantage to work through other companies, although there is a possibility that we might go into a bulk dry operation of our own at a later date."

Like most of Washington Co-op operations, decisions concerning their ventures into new fields depend much upon the demands made upon the organization by the members. Most recently, Washington Co-op became a part-owner of Central Farmers Fertilizer Co., which is an organization of regional co-ops from the west coast and the midwest. Central just recently began operation of a new phosphate plant at Georgetown Canyon near Soda Springs, Idaho.

This particular plant uses a TVA process which allows it to make a 52-54% triple superphosphate. Washington Co-op will be supplied by Central with a superphosphoric acid (75% P_2O_5 compared with the normal 50-52%). Using the more concentrated raw

materials, they plan to make a 11-33-0 liquid ammophos, — considerably higher grade than the 8-24-0 made before.

This formula (11-33-0) has several real advantages in complete liquids, since it acts as a sequestering agent and allows greater use of minor elements in the various mixes. Use of green acid directly is also feasible, with the 11-33-0 formulation. "We also plan to investigate some new potash solutions in order to increase the potash ratio in liquid fertilizer," said Wyckoff.

Central is rapidly expanding in sales and production. Among their interests are ammonia plants at St. Paul, Minnesota and Lawrence, Kansas. They recently took over complete distribution of products of National Potash Co.

Among the basic services included in their overall program is soil-testing: "We are sold on the importance of soil testing," said Mr. Wyckoff. "It is a definite asset to proper fertilization. We use the college testing programs in preference to any testing program of our own, simply because we find that farmers, in general, have complete confidence in the college reports and recommendations. They feel that the college has no axe to grind — that the college isn't trying to sell them fertilizer, only telling them what their land needs.

Then it is up to us to follow through and see that the farmer gets what is needed for a successful program.

"At the local level, however, we do assist the farmer in taking the soil sample, and this works to our advantage, also. It gives us our best opportunity to sell the farmer, to see his field and know what he is planning in the way of a program, as well as giving us a better opportunity to judge the program he ought to have. It does not make sense to go out and try to sell a grower a 100% program of fertilizer, if he is using a 50% management program. We attempt to improve his management and sell a fertilizer program that fits his ability as an operator. Of course, when we give him service like this on a local level, we try to tie-in the grower with as complete a program as possible, including not only his farm chemical needs, but other essentials as well. Our farm credit program is based on firm banking principles, and a grower's credit has to be sound before the co-op will extend credit."

The physical operations of the co-op plants are much the same in all of their locations, with the liquid materials being mixed at the plants, and applied either by a co-op employee or the grower.

Capacity of their various plants averages 15 tons an hour on daily output, with many of the plants putting out an average of 5000 tons of material during the operating season. The smallest plant in the operation averages about 1000 tons a season.

As to the location of liquid plants, Mr. Wyckoff remarked:

"Before we go into an area with a liquid operation, we usually wait for the growers in that area to approach us requesting such a service. Then we survey the area to see if there is enough demand for the service to make it economically feasible. We prefer to operate this way, rather than making the grower feel that we are establishing a service first, and then trying to sell him on our program."★★

BARRING unexpected demands, supplies of pesticides are expected to be adequate during the 1959-60 crop year* to meet requirements of agricultural and other consumers in the United States as well as export trade. Although the chemical industry is experienced in predicting the market for specific items, it cannot foresee such unusual conditions as sudden heavy outbreaks of insects and plant diseases, or quick shifts in consumer demand. For most materials, satisfactory alternates will be available whenever inventories and current production of particular items are insufficient from which to fill orders.

Production of DDT was higher in 1959 than ever before, while benzene hexachloride and copper sulfate production were both lower than for many years. (Table 1). The industry was on the verge of a shortage of benzene by the time the 1959 steel strike was settled. Its requirement for this raw material used in the manufacture of synthetic organic pesticidal chemicals such as DDT, benzene hexachloride and 2,4-D amounts possibly to 35,000,000 gallons. A figure for the 1959 production of all synthetic pesticidal chemicals will not be available for several weeks. However, it will probably be higher than in 1958 when 539,396,000 pounds were produced, and possibly close to the 1956 record of 569,927,000 pounds.

Production of synthetic organic pesticidal chemicals in 1958 had a value of \$239,390,000, calculated from unit sales values as reported by the U. S. Tariff Commission. Insecticides comprised about 53 per cent, herbicides 26 per cent, and fungicides together with soil fumigants 21 per cent. The relatively small value of synthetic organic rodenticidal chemicals produced cannot be segregated from these figures.

Pesticide Situation for 1959-60

Manufacturer's Sales of Pesticides Up 5% during '59 — Sales Value at about \$660 million — '59 gain occurred without stimulus of outbreak of insect pests or plant diseases.

This article is based on a report prepared by H. H. Shepard of the Commodity Stabilization Service, USDA, Washington, D. C.

Total production of all pesticidal chemicals and related materials, exclusive of dust diluents, solvents and surface-active agents, amounts to approximately 1,000,000,000 pounds annually. This figure includes ground sulfur for dusting and spraying, as well as other inorganic chemicals (arsenical and copper compounds, sodium chlorate, borates, etc.). Finished

pesticidal preparations containing these chemicals probably amount to three billion pounds (1,500,000 tons). Primary manufacturers' sales of all pesticidal chemicals advanced about 5 per cent during 1959. Translated into cost to consumers, the total sales value at the users' level would be 550 to 660 million dollars. The 1959 gain in sales occurred without the stimulus of

Table 1. U. S. production of some major pesticidal chemicals by calendar years, 1957-1959.

Chemical	1957	1958	1959
	1,000 lb.	1,000 lb.	1,000 lb.
Aldrin, chlordane, dieldrin, endrin, heptachlor, and toxaphene (combined production)	75,424	98,280	86,868
Benzene hexachloride (gross) ²	39,559	30,797 ⁴	26,733
Benzene hexachloride (gamma equivalent) ²	7,300	6,500 ⁴	5,197
Calcium arsenate	19,478	10,432 ⁴	8
Copper naphthenate	2,130	1,853	8
Copper sulfate	141,360	97,192	80,584
2,4-D acid	34,251	30,944 ⁴	29,277
2,4-D acid esters	24,137	21,938 ⁴	
2,4-D acid salts ³	3,182	2,964 ⁴	31,194
DDT	124,545	145,328 ⁴	156,738
Disodium methylarsonate	618	368	8
Lead arsenate	11,920	14,938	8
Methyl bromide	9,653	10,224	8
Methyl parathion	1,925	5,018	8
Nabam	4,961	8	8
Parathion ("ethyl parathion")	5,962	5,439	8
Pentachlorophenol	28,346	35,177	8
Phenyl mercuric acetate	570	1,056	8
Sodium chlorate	118,284	134,498	175,330
2,4,5-T acid	5,334	3,678	5,583
2,4,5-T acid esters	6,831	5,230	8
Ziram	1,277	1,178	8

¹ Preliminary.

² 1958 and 1959 include lindane; 1957 without lindane.

³ Sodium and amine salts.

⁴ Revised figure.

⁵ Figure not yet available.

⁶ Figure not publishable because it would disclose individual operations.

Sources: U. S. Tariff Commission; U. S. Bureau of the Census; U. S. Bureau of Mines; chemical industry.

*The crop year is considered to be the 12-month period ending September 30, the date at which the peak season for pesticide application is past for most of the United States.

Table 2. Exports of 75 per cent DDT to some principal Asiatic destinations (100 per cent basis).

Country	1958	1959
	Pounds	Pounds
India	22,559,248	29,950,562
Indonesia	2,231,025	2,328,875
Vietnam	105,000	1,592,625
Philippines	44,000	1,070,210
Thailand	237,683	152,989
Nepal	7,500	138,000

Source: U. S. Bureau of the Census, Report No. FT 410, Part II.

any spectacular outbreak of insect pests or plant diseases.

The dollar value of U. S. exports of pesticides, although up 4.7 percent in 1959 (totaling \$85,938,859) over the previous year, was slightly under the record attained in 1957 of \$86,002,270. Over the last four years exports appear to have levelled off at about \$84,000,000 worth. World health programs will tend to maintain this level or raise it somewhat. Exports of benzene hexachloride, 75 per cent DDT and organic phosphorus insecticides in 1959 were notably greater than in 1958. A number of other pesticides (especially copper sulfate and technical DDT) were exported in considerably smaller quantities.

The extent of U. S. shipments of 75 per cent DDT to particular countries during the last two years, chiefly in connection with the malaria eradication program is as shown in Table 2.

Purchases of DDT by the Government Services Administration for the International Cooperation Administration's program of malaria eradication amounted to 35,290,600 pounds (technical basis) during the 1958-59 fiscal year. Most of this quantity was purchased as 75 per cent wettable DDT, only 98,500 pounds being technical. About 45,000,000 pounds DDT (technical basis) are expected to be delivered by the end of the 1959-60 fiscal year in the ICA program. UNICEF (United Nations Children's Emergency Fund) and the Pan American Sanitary Bureau also use appreciable quantities of DDT in world health programs.

Pesticide Carryover

Total carryover from the 1959 season by primary manufacturers and formulators of pesticides was at about the same level as on September 30, 1958, according to figures obtained in the annual inventory survey conducted by the U. S. Department of Agriculture in cooperation with the National Agricultural Chemicals Association (Table 3). Stocks of primary chemicals in the possession of their pro-

ducers averaged 12 per cent lower than at the end of the previous year. Primary producers, some of whom are also formulators, reported 63.4 per cent of all stocks. Of all carryover reported, whether possessed by primary manufacturers or mixers, formulations comprised 36.2 per cent.

Stocks of such established materials as parathion and methyl parathion were lower on September 30, 1959 than on the same date in 1958 (Table 4). As is generally true of newer pesticides, phosphorus insecticides recently coming into commercial production were carried over at the end of the 1959 season as a group in two to three times the volume of the previous year's end-of-season stocks. In many cases, each chemical is made by a single producer, so information as to production and stocks cannot be divulged. Exports of phosphorus

Table 3. Manufacturers' stocks of pesticides (technical basis), September 30, 1959.¹

Material	All Stocks		Primary producers' stocks	
	Technical and mixed	Percentage mixed	Technical	1959 as percentage of 1958 ²
	1,000 lb.		1,000 lb.	
Aldrin, chlordane, dieldrin, endrin, heptachlor, toxaphene	39,615	32.5	29,639	128
BHC, including lindane				
Gross basis	21,970	26.3	11,217	66
Gamma basis ³	(4,794)	30.1	(2,098)	56
Calcium arsenate	5,258	21.4	4,850	63
Copper fungicides	14,175	9.1	11,527	86
2,4-D (acid basis)	13,395	62.6	11,374	46
DDT	29,628	36.3	14,192	108
Fumigants, grain and soil	34,572	—	26,348	—
Lead arsenate	4,414	27.5	3,379	129
Miticides, miscellaneous	2,620	59.4	1,257	95
Organic				
phosphorus compounds	10,259	41.9	4,593	50
Sulfur, ground	29,486	46.0	6,233	76
2,4,5-T (acid basis)	4,295	49.8	3,728	86
Other fungicides	12,922	47.8	7,545	121
Other insecticides	8,008	40.9	4,473	98
Other weed killers	17,017	49.3	16,283	156
Miscellaneous, including rodenticides	2,322	14.7	1,800	87
TOTAL	249,956	36.2	158,438	88

¹ Results of survey by U. S. Department of Agriculture in cooperation with the National Agricultural Chemicals Association, final report.

² Based on goods in the possession of their primary manufacturer; i.e., DDT stocks of DDT producers.

³ BHC (gamma basis) omitted from totals to avoid duplication.

insecticides in 1959 were 2.4 times the 1958 level.

The proportion of pyrethrum imports in the form of extract rose greatly in 1959 (549,120 pounds) and imports of flowers dropped to less than one million pounds. The value of all pyrethrum imports climbed to \$5,295,467, — a 39 per cent increase over 1958. According to reports from Kenya, several years of abnormally heavy rainfall followed by severe drought in 1959 have resulted in reduced yields of African pyrethrum. This situation coincided with a drive for increased production and sales. However, unsold stocks carried over from 1958 were sold last year to satisfy the rapid increase in demand for pyrethrum. The value of extract exported by the United States in 1959 amounted to \$224,000.

The General Services Administration has made available 141,808 pounds of pyrethrum extract from the National Stockpile in April 1960. Total disposal, inclusive of this offering, will amount to 342,808 pounds.

Fungicides

Shipments of copper sulfate for domestic agricultural use in 1959 were nearly as high as in the previous year (38,824,000 lbs. in '59 compared with 41,608,000 lbs. in 1958). Production, however, amounted to only 80,584,000 pounds (see Table 1), lower than in any year since before 1937. Exports also were lower in both 1958 and 1959 than in any year since before 1937. Since the sudden switch of Latin American banana

Table 4. Inventories of parathion and methyl parathion on September 30th (all reports; unpaired).

Material	1958 1,000 lb.	1959 1,000 lb.
Parathion:		
Technical	1,646	1,035
Formulated	1,640	1,273
Total	3,286	2,308
Methyl parathion:		
Technical	2,722	1,010
Formulated	463	237
Total	3,185	1,247

growers to oil sprays in 1958, some areas have returned to the use of copper sulfate. This reversal of the trend appears yet to be rather spotty, Panama receiving 3,384,000 pounds or 63.3 per cent of U. S. exports in 1959. Colombia, Costa Rica, Guatemala and Honduras together received 56,838,000 pounds in 1957, but only 946,000 pounds in 1959.

Herbicides

The number of chemical weed killers on the U.S. market, especially those of the pre-emergence type, grows steadily. Many preparations are designed for specific purposes, for instance, as crabgrass or chickweed killers for home lawn consumption. Pre-emergence herbicides are in increasing use in the Midwest on land in corn or soybeans. In fact, it is reported that in 1959 about 57 per cent of commercial farmers used herbicides. Corn accounted for more treated acres than all other crops combined. Corn acreage treated with pre-emergence herbicides in 1959 was more than twice that so treated in 1958. Almost twice as

much cotton was treated as in the preceding year.

According to a survey of the herbicide market published last summer, types of herbicides applied on commercial farms are in the following proportions: post-emergence crop sprays, 51.7 per cent; pre-emergence crop sprays, 6.8 per cent; and pasture weed and brush sprays, 41.5 per cent.

The State of Minnesota Department of Agriculture, Dairy and Food reported that in 1950 only 13.3 per cent of grain grown in the State was treated. Treatment of grain acreage has grown steadily there until in 1959 the percentage was 44.6 per cent.

A relatively large quantity of sodium chlorate is consumed annually for weed control and defoliation. The U. S. Department of Commerce estimates that about 33,000,000 pounds go into herbicide preparations, and 5,000,000 pounds into defoliants for use on cotton and soybeans. These uses comprise about 25 per cent of U.S. sodium chlorate consumption. Borates are mixed with sodium chlorate at the rate of about 0.72 pound of borate to each pound of chlorate to overcome the fire hazard of the latter. It has been estimated that the total quantity of borates consumed in herbicides and defoliants annually is about 50 million pounds, some being used by themselves in weed control.

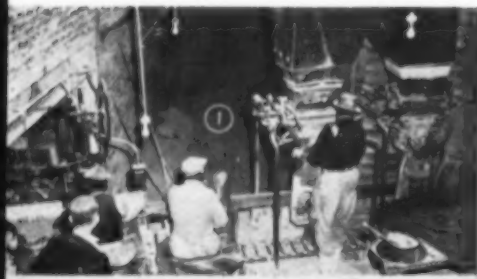
Production of 2,4-D acid was appreciably lower in 1959 than in the preceding year, while 2,4,5-T was produced in larger amount.

(Continued on Page 101)

Table 5. Solid carriers and diluents consumed in pesticide formulations, 1956-1958.*

Material	1956 1,000 lb.	1957 1,000 lb.	1958 1,000 lb.
Talc and soapstone	109,586	90,368	75,776
Pyrophyllite	86,264	84,332	84,570
Fuller's earth	228,854	134,954	170,552
Kaolin	80,480	78,300	72,398
Bentonite	37,694	37,486	60,584
Other	46,480	3,250	3,526
Totals	549,358	428,690	467,406

*Figures for 1959 not yet available.
Source: U. S. Bureau of Mines, Division of Minerals, Branch of Ceramic and Fertilizer Materials.



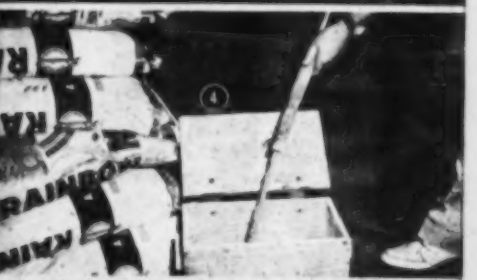
(1) Bagging the product in a fertilizer plant.



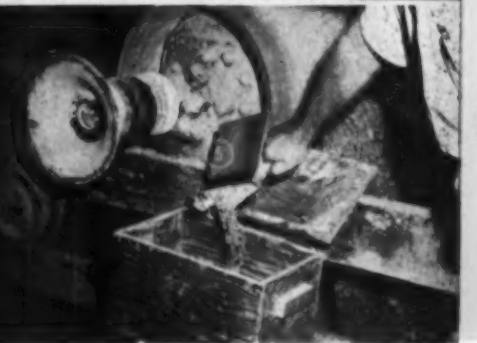
(2) Bagged fertilizer moved from a transfer belt to a hand truck.



(3) In fertilizer plant: Inserting a sampling tube diagonally in a fertilizer bag to obtain sample core. Note covered sample container.



(4) Sample core is transferred from tube to sample container.



(5) Cup is emptied into container, which is then promptly closed to prevent contamination.



(6) (A) Riffing a sample. Sample is next poured on cloth, rolled and flattened with plasterer's "hawk" (B) after which it is scooped (C) into suitable container.



(7) The sampling instruments required: (a) special cup; (b) tube sampler; (c, d) modified sampling tube adapted for powdered fertilizers; (e) flat-bottomed scoop suitable for sampling wet material; (f) 4-mesh screen used for screening out all large pieces; (g) a riffle; (h) rolling cloth; (i) plasterer's hawk; (j) small scoop for taking laboratory sample.



(8) State inspector sampling fertilizer on route to dealer's warehouse.



(9) Checking the weight of fertilizer bags.



(10) Samples are received at State laboratory under lock and key from official inspectors.

The Chemical Control Laboratory in the Fertilizer Industry

by Vincent Sauchelli

Chemical Technologist, NPF1
Washington, D. C.

"THE lot of the control laboratory, and the chemist in it, is not an easy one. The work is concerned with large volume, bulk materials (by some standards crude materials) varying in physical and chemical composition and hence, difficult to sample accurately. Variations in chemical composition before, during and after processing in the fertilizer plant, make comparative analyses difficult even with good sampling. Processes have continued to grow in complexity and are subject to all normal problems aggravated by the conditions previously mentioned.

"Then, there is the inescapable fact that control laboratories are working with a product that is cheap as dirt. That is an almost literal, rather than figurative, statement. What is the average selling price of plant food? Three cents a pound, or less? What else can you buy today at that price?

"Add all these conditions together and you see the problem. . . . The control laboratory must chart the course between the scylla of cost control and the charybdis of state inspection. It must prevent overformulation and other inefficiencies leading to higher costs and at the same time provide insurance against the problems caused by failure to pass state inspections. . . .

"[The control laboratory] should be one of the strongest links in the management chain, connecting research, production and sales, acting as an extension of each and insuring a strong safe bond to the customer."

(11) Samples are given a laboratory number, all records are removed when given to the analytical chemist, and a code number placed in sample. Illustration shows grinding of sample preparatory to analysis.



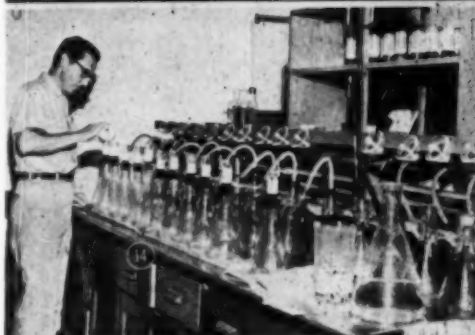
(12) Weighing the sample. Special room, air-conditioned in many laboratories to control humidity.



(13) Analyzing for nitrogen and phosphorus by instrument.



(14) In the phosphoric acid laboratory-chemical method.



(15) Determining potash; using the flame spectrophotometer.



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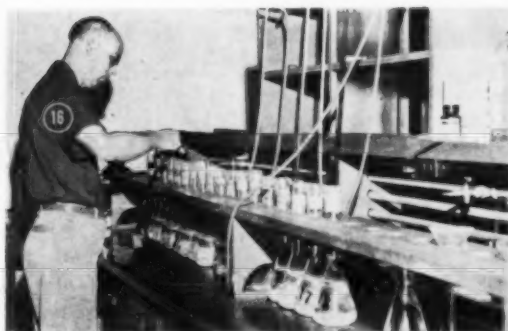
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(16) Determining potash by the chemical gravimetric method.



(17) Recording the results of the analysis

In the preceding quotation, taken from a talk given last October by Mr. Nelson White, vice president, International Minerals & Chemical Company, the speaker representing management expressed an appreciation of the role the chemical analyst plays in the daily production life of a large enterprise.

Chemical analysis of fertilizers is an important function in the production and marketing of commercial fertilizers. In today's modern fertilizer plants and technology, the chemical laboratory is recognized as an indispensable aid in manufacture. Every ton of fertilizer sold has to measure up to the guaranteed analysis. In addition to the chemical control exercised by the manufacturer, every state has a control laboratory which periodically samples and analyzes the fertilizers offered for sale within its borders. An elaborate system of chemical control thus operates to protect the honest manufacturers and the farmer consumer against fraud and misrepresentation.

A great responsibility is placed on the chemical analyst. The work he performs is highly professional and deserves greater recognition

from the public and, in many instances, from the higher echelons in management. Because of the multiplicity of ingredients in many kinds of modern mixed fertilizers, which contain 3 to 6 different sources of plant food—and very frequently, insecticides—chemical analysis makes much heavier demands upon the skill and resources of the laboratory than formerly. Older methods of analysis are being replaced for some analyses by accessory electronic equipment for greater speed, accuracy, and economy. This calls for new skills and different attitudes toward one's work.

Believing that not too many persons are acquainted with operations in an actual laboratory, we have selected a series of pictures which illustrate the facilities needed in a typical, modern fertilizer chemical laboratory.

Acknowledgments:

We are indebted to International Minerals and Chemical Corporation Chemical Laboratories, for illustrations Nos. 1 to 9 inclusive, and to the South Carolina State Department of Fertilizer Inspection and Analysis for illustrations Nos. 10 to 17 inclusive.★

ADDING TRACE ELEMENTS TO LIQUID FERTILIZERS

THE need for including additives in fertilizer has introduced problems in production. In making solid mixes, it is difficult to get good mixing of the small amount of additive with the large volume of other materials, and once mixed,—segregation may take place in handling. Moreover, some additives may not be compatible chemically with the main constituents of the mixture.

In liquid fertilizer production, the problem of incorporating the additive thoroughly is simplified, but other problems may be increased, depending on the particular additive involved. If the additive is soluble, incorporating it in the liquid is easily accomplished, and the product usually is quite satisfactory. Unfortunately, many of the additive materials needed are not soluble and therefore considerable difficulty may be encountered in incorporating them satisfactorily.

Secondary and Trace Elements

OF the secondary elements, calcium and sulfur are the ones most often added to liquid fertilizers, but calcium is not compatible with liquid mixed fertilizer, because it precipitates as the phosphate. There appears to be little need for adding it to mixed liquids, however, since in most cases use of lime from local sources should be more economical than including calcium in fertilizers.

Sulfur is added both to nitrogen solutions and to liquid mixed fertilizer.

Little magnesium appears to have been used in liquid fertilizers. Like calcium, it precipitates as the phosphate from neutral mixes containing phosphate. The best method for incorporating magnesium and other insoluble materials in liquid products probably is the suspension technique.

(Continued on Page 103)

Increased Basic Research Called For At Symposium On Pesticide Residues

The availability of more efficient equipment for applying pesticides would reduce the amount of chemical needed for insect control and, thus, would reduce residues of chemicals. Engineers, however, are hampered in the development of such equipment by a lack of basic knowledge about the behavior of pesticides during and after application.

Basic research is needed to determine the complex effects of physical factors on the movement of chemical particles from the time they leave the applicator until they are deposited on the plant or the soil. Also needed is information about pesticides after they have entered plants and soils that contain elements that alter their chemical composition.

THE need for well-coordinated research between biologists and engineers to determine the optimum placement of chemicals for most effective control of pests was stressed by Walter M. Carleton, Agricultural Engineering Research Division, ARS, USDA, Beltsville, Md., at a symposium on the nature and fate of chemicals applied to soils, plants, and animals, held April 27 to 29 at Beltsville.

Dr. Carleton said more efficient equipment for applying chemicals is needed, but engineers are hampered in developing such equipment by a lack of basic knowledge about the behavior of materials during and after application. Increased basic research is needed, he said, to determine the complex effects of physical factors on the movement of chemical particles from the time they leave the applicator until they are deposited. In addition to the size and weight of particles, these factors include aerodynamic forces, the forces of gravity, inertia, electrical charges, and temperature differences.

Improved equipment to deposit chemicals in pre-determined locations not only would increase the effectiveness of pesticides, Dr. Carleton pointed out, but would also reduce substantially the amount needed for optimum con-

trol. This, in turn, would reduce the cost to farmers and reduce drift and residue hazards to man, animals, beneficial insects, and crops.

Although present equipment and techniques of application have resulted in substantial gains to agriculture, methods still are relatively crude, he said. Engineers estimate that only 10 to 20 per cent of pesticides applied as dusts by present equipment adhere to the proper location and actually are effective. Research has shown, Dr. Carleton continued, that if equipment were available to apply pesticides to the proper location on tobacco, for example, optimum control of pests could be obtained with only one-fifth of the recommended dosage.

The responsibility of the U. S. Department of Agriculture for research on chemicals in agriculture was outlined by Dr. T. C. Byerly, deputy administrator, ARS, Washington, D. C., who said that, in 1960, \$6,554,500 will be spent for research related to the safe use of chemicals in agriculture and for the development of biological and other non-chemical methods of pest control.

"Our current and past research program has made it possible to protect crops and livestock against many pests with safety to those

crops and livestock, to the user, and to the public," Dr. Byerly said, "but, in our response to the many urgent problems which had to be solved quickly with limited funds and facilities, we have lagged gravely in basic research."

Pointing to the record of safety in the use of agricultural chemicals, Dr. Byerly said, "I know of no proven case of injury to human health from use of such chemicals according to procedures permitted by the Department of Agriculture and the Department of Health, Education, and Welfare; and instances of injury to crops, livestock, and wildlife are small relative to the enormous benefits realized."

"We are handicapped in use of existing chemicals and deterred from the use of many new ones by lack of adequate information." Speaking of residues, Dr. Byerly said that "until we know the metabolic fate of every chemical we use and of all their metabolites, how can we be sure that we can meet zero tolerances?" It is not enough, he said, to have adequate information on a chemical itself, we must have information on all forms of the chemical and its use on specific plants.

Advances in pest control are due to cooperation between research personnel of industry, the

USDA, and state experiment stations, said Dr. E. F. Knipling, Entomology Research Division, ARS, Beltsville. Most materials in use today, he said, come from industrial laboratories, but publicly supported laboratories have contributed necessary information on biological effectiveness of compounds and have obtained residue data for labelling.

The opportunities for new and safer approaches to insect control are virtually unlimited, Dr. Knipling declared, and there is every reason to believe that rapid advancements can be made. Among the desirable channels into which research could be directed that were listed by Dr. Knipling was the development of hormone-type chemicals that would prevent normal development or behavior of insects. In addition, he said, the male sterility approach to pest control needs investigation for its applicability to types of insects other than fruit flies, and the utilization of insects, themselves, for self destruction needs to be explored.

In regard to pesticide hazards, Dr. Knipling said that the problem is more imaginary than real. Pointing out that the record of safety in the use of pesticides is outstanding, Dr. Knipling said that there is no evidence of significant decline of fish and game that can be traced to insecticides, even in areas where pesticide use is common.

The public is entitled to both insect control and safe control procedures, he said, but it must be prepared either to support research to develop more efficient control methods or pay higher prices for food and fiber. When DDT became available to potato growers, he pointed out, yields doubled in many areas and the use of newer insecticides has doubled cotton production.

If the present residue regulations prevailed during World War II, Dr. Knipling said, DDT probably would never have been developed—yet it has been applied inside people's clothes to control

body insects and has been used as a space spray in homes for 15 years without a fatality. It is one of the safest insecticides ever developed, he said, and has saved countless lives, yet it is the most heavily maligned of all pesticides.

Dr. Knipling urged sane consideration of all factors pertaining to insecticides if progress is to be made in the development of improved and more efficient pest control methods.

The responsibilities of industry with respect to chemicals in agriculture were discussed by G. R. Ferguson, vice president of the National Agricultural Chemicals Association and president of Geigy Agricultural Chemicals, Ardsley, N. Y. He said that the trend toward increasing legislation has caused many companies to abandon the manufacture of pesticides. Mr. Ferguson pointed out that agricultural pesticide sales at the farmer level represent only about 2 per cent of all chemical sales and companies hesitate to take risks at these odds. In addition, he said, many promising chemicals have been dropped when the potential market did not appear to offer profit. The basic responsibility of industry, Mr. Ferguson said, is to make a profit.

Although there has been criticism of manufacturers on the part of anti-spray writers, Mr. Ferguson pointed out that he did not believe that any company would risk damaging its public relations by marketing a product of which it was not completely confident. He said that the most important industry responsibility is to its customers, and products. "We must know what we are selling," he said, "in order to advise users."

There is no question, Mr. Ferguson declared, that our problems are becoming more complex simply because chemicals are becoming more complex. Pesticides are an essential link in the chain of food production, and a chain, of course, is only as strong as its weakest link, the speaker reminded. "I am not

implying that we should relax any safeguards," he continued, "but I am saying that any reduction in pesticides can harm our production of crops."

Mr. Ferguson concluded: "The use of chemicals not only is a necessity in the production of food, but it also is an economic necessity to farmers."

The remarkable progress during the past two decades in the use of chemical herbicides, fungicides, growth regulators and nematocides was cited by Dr. W. B. Ennis Jr., chief of the crops research division, ARS, Beltsville. He said that early use of chemicals for weed control was limited because the available chemicals lacked efficiency and selectivity but the present availability of selective products has stimulated increased usage.

In 1949, he pointed out, 23 million acres were treated for weed control in the United States and by 1959 this figure had risen to almost 48 million. The use of herbicides has resulted in an estimated annual saving of \$40,000,000 to farmers, he said. Also cited by Dr. Ennis as recent advances, were the rise in the use of growth regulators and soil fumigants. In 1946, he said, only 250,000 acres of cotton were treated with defoliant, but in 1960 the figure is expected to be 6,250,000.

This increase in the use of chemicals, however, has brought problems, Dr. Ennis warned. To insure that chemicals will not harm people, he said, much more research is called for. Dr. Ennis said also that there still exist some weeds which cannot be controlled satisfactorily by chemical means. Satisfactory growth regulators are needed for optimum production of plants, he said. Bacterial diseases are not adequately controlled with present fungicides, he declared, and virus diseases are not controlled with present chemicals or methods.

Dr. Ennis called for expanded research in the development of ap-

(Continued on Page 116)

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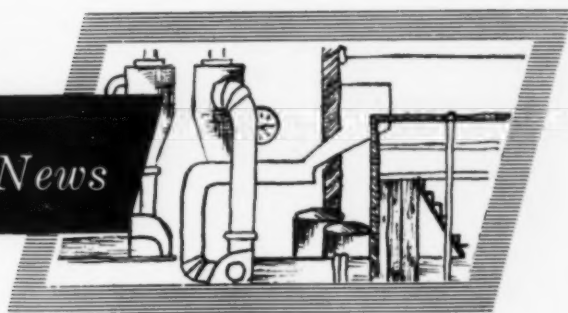
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Fertilizer Views and News



Baltimore Fertilizer Producers Meet Weekly

A LOOK at the industry calendar is very tangible evidence of the interest operating people of the agricultural chemicals industry have in getting together to exchange information on mutual operating problems. The trend for "getting together" is further evident in the small side groups of parent associations, calling for regional meetings, etc.

Agricultural Chemicals was particularly interested in a further refinement of the "getting together" or "bull-session" type meetings, when it learned some time ago that about a dozen fertilizer operators, machinery fabricators and suppliers in the Baltimore, Md., area meet occasionally Saturday mornings to discuss current and old topics dealing with the manufacture of fertilizers.

The group usually meets in

Al Spillman's office or Walter Sackett's conference room—which is just across the tracks. At a recent Saturday morning meeting it was our pleasure to attend the so called "Fertilizer Cabinet" in Mr. Spillman's office with "Doc" H. M. Marshall, W. S. King, Gus Mautner, Walter Sackett and Harry Fader, all of whom are well known in the fertilizer industry, and in the Fertilizer Industry Round Table, of which Doc Marshall and Al Spillman are officers.

Although the meetings are unscheduled (simply an informal affair) and there is no formal organization,—they are attended frequently by visitors from all over the country, and occasionally from as far away as South America, India, England, etc. The doors are open, and Al Spillman says, "if you're in Baltimore Saturday morn-

ing, phone us, there may be a cabinet meeting in session,—come in and have coffee with us,"—and by the way sit in on the discussions of the advantages (and disadvantages) of various processes,—quality control in the fertilizer plant,—or any other topic bothering any participant that particular morning.★

Book Review

Soil, Grass and Cancer, by André Voisin; Translated from the French by Catherine T. M. Herriot and Dr. Henry Kennedy. Publishers: Philosophical Library Inc., New York City, N. Y. Reviewed by Vincent Sauchelli.

THIS most recent book by André Voisin displays the usual intelligent approach to problems made familiar to us by his previous book, "Grass Productivity."

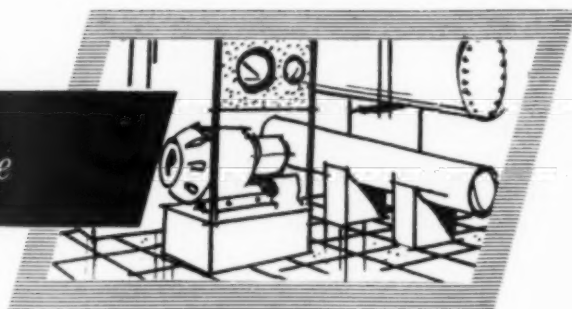
More and more evidence is constantly accumulating to show the close link between the health and vigor of beast and man and the mineral balance of the soil. Voisin earnestly believes that the control and prevention of cancer lies in a more profound understanding of human nutrition. Perhaps he may be right. Undoubtedly mankind today does face a most important problem in knowing all that should be known about its nutrition. Discussions as to the real cause of cancer are most speculative at present. Since scientists who should know recognize the present limited knowledge of the metabolism of the living cell, Mr. Voisin may be allowed his observations and suggestions as those of an independent thinker, even though we may believe his hypothesis is too simple to be true.

We enjoyed our coffee and informal discussions one recent Saturday morning in Spillman's office: Participating Cabinet (left to right) Al Spillman,

W. S. King (standing), Gus Mautner, Harry Fader (standing), Doc Marshall and Walter Sackett. The unscheduled meetings usually are well-attended.



Production Roundtable



Centrifugal Equipment for Mixing and Milling

A TYPICAL pesticide dust formulation, as used in the field, contains about 98% inert ingredients over which the toxicant must be uniformly distributed. (Very often, however, dusts are made up as 20 to 50% concentrates for ease of storage and transport, and then "let down" locally as needed). In either concentration one of the very critical operations is the intimate blending of the small percentage of active toxicant in the final product.

A standard unit in pesticide dust formulation pre-mixing is the ribbon blender type of dry mixer. For homogeneous mixing of the bulk material with a small quantity of toxicant, however, an after blender is required which will not only blend dry materials, but also some quantity of liquid with the dust.

A centrifugal mixing machine is a relatively new type unit, providing thorough mixing and blending action, which is particularly suitable for pesticide formulation.

Several installations in pesticide formulating plants have proved the efficiency of the equipment. The Terre Co., Totowa, N. J. has two Entoleter units: one (the high speed mixer) for use in pesticide formulations and another (Entoleter CentriMil) for milling fertilizers.

In the Terre pesticide formulating plant, carrier and dye are weighed into a ribbon blender, into which the necessary quantity of insecticides such as (chlordane, dieldrin, etc.) are sprayed, and the combination mixed. This pre-blended mixture then passes through a 1/16-mesh brush screen into the Entoleter mixer for final blending, after which the finished product is bagged. The Terre pesticides formulated in this plant are the lawn insecticides, D-Chlor and Bug Tox (chlordane and dieldrin active ingredients) and the fungicide D-Crab (disodium monomethyl hexahydrate arsonate).

The Entoleter mixer is made by Entoleter, Inc., a subsidiary of

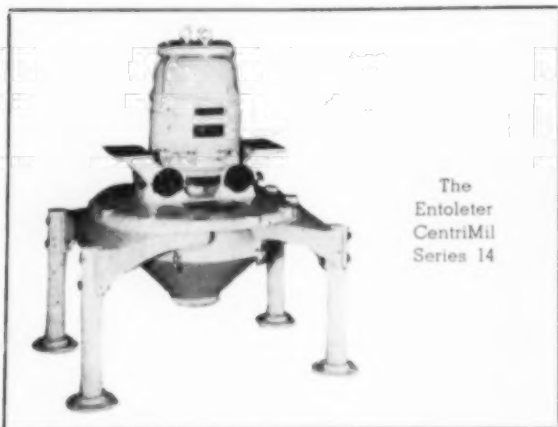
American Manufacturing Co., Inc. This manufacturer reports that for pesticide dust blending a standard 7½ HP, 3500 rpm Entoleter mixer is adequate.

The Centrifugal Mill and Mixer

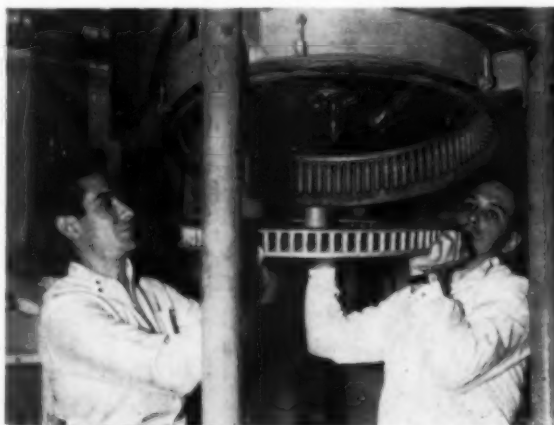
THE other centrifugal unit mentioned previously is the centrifugal mill, the Entoleter CentriMil. In this equipment, particle size reduction is accomplished solely by impact. Rotor speed determines the energy applied to the product,—and since this speed can be closely regulated, the desired particle size reduction can be held within a narrow band with minimum fines. In the agricultural chemicals industry, a 10 hp Entoleter CentriMil is used effectively in fertilizer manufacture.

According to the manufacturer, the centrifugal impact mill has high mechanical efficiency because there are no frictional resistances within the machine, no cutters, screens, attrition or close tolerances. Three different sized units

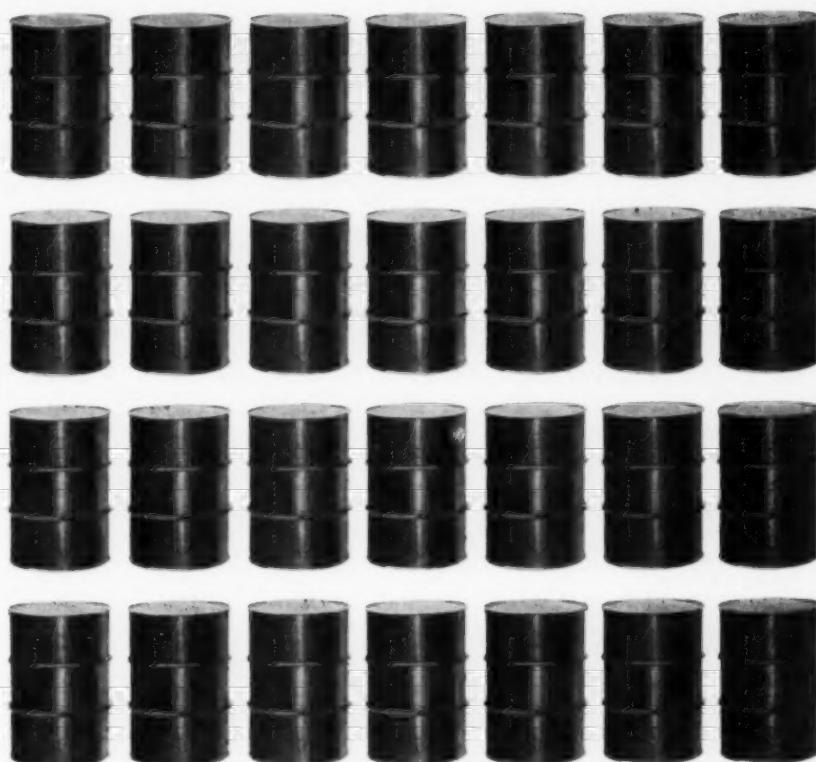
(Continued on page 116)



The
Entoleter
CentriMil
Series 14



Why stock
all of these
agricultural
emulsifiers?



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Figure 1: Rainy Weather

This graph shows the percentage of cotton plants that are damaged by the overwintered weevil in rainy weather. The y-axis is labeled 'PERCENTAGE OF COTTON PLANTS DAMAGED' and ranges from 0 to 100. The x-axis is labeled 'PERCENT RAIN' and ranges from 0 to 100. The curve shows that as the percentage of rain increases, the percentage of cotton plants damaged by the overwintered weevil also increases.

Figure 2: Fair Weather

This graph shows the percentage of cotton plants that are damaged by the overwintered weevil in fair weather. The y-axis is labeled 'PERCENTAGE OF COTTON PLANTS DAMAGED' and ranges from 0 to 100. The x-axis is labeled 'PERCENT RAIN' and ranges from 0 to 100. The curve shows that as the percentage of rain increases, the percentage of cotton plants damaged by the overwintered weevil decreases.

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Aerial Spraying In England

The Spray Controversy

Even the earliest spraying operations (top photo shows 1890's spray rig in action) were involved in controversy about the use of agricultural chemicals. Today, with the development of vastly improved pesticides and equipment, (bottom photo shows Hahn Hi-Boy sprayer) public opinion has shifted in favor of spraying but controversy continues. See page 57 for report on one aspect of the problem.



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Many recent newspaper and magazine articles concerning the possible detrimental effects of insecticides on wildlife are highly emotional and frequently give only the partial facts which leave disturbing doubts in the mind of the public.

Applicators are urged to make an effort to cooperate with conservation groups, garden clubs, and Audubon societies when planning large spraying programs that might affect public lands, and thereby avoid much uninformed criticism.

Spray Controversy Hinders Efficient Control Operations

by Joseph A. Dietrich

Supt. of Parks and Trees
Greenwich, Conn.

IN a national controversy involving the use of pesticides for insect and plant disease control, agricultural products, public shade trees, and forests, as well as general public recreation, are receiving a great setback. Many reliable and conscientious city officials and commercial sprayers are finding themselves in the middle of the controversy and many reliable and thoroughly tested chemicals are being by-passed in the interest of harmony and at the expense of adequate pest control.

Perhaps the most reliable and thoroughly-tested pesticide chemical of them all is DDT, the target of organizations and individuals who condemn the use of pesticides. Practically every human ailment, including cancer, heart trouble, nervous disorders, and baldness, has been blamed on some phase of chemical spraying and, specifically, DDT. Pesticides also are blamed for real and imagined wildlife losses.

An example of such a charge, and its somewhat more than distant relation to the facts, is the declaration made in 1957 by a group called the Animal Protective League which said that there was 80 to 100 per cent mortality of birds and wildlife in Batavia, Ill., because of DDT spraying and that there are no more birds in Batavia. Following the charge, a special bird census was undertaken in the area by the Illinois Natural

History Survey which revealed that there still are birds in Batavia.

On Aug. 15, 1957, there were four birds per acre in Batavia with 16 species represented. The general average of birds in communities of the Fox River Valley, where spraying had been done for the Dutch elm disease, was 3.6 per acre, compared with an average of 4.8 in towns where no spraying was done. Sprayed Princeton had 6 birds per acre and unsprayed Mendota had 4.8. There are many variables which might affect exact figures, but at least we can conclude that even the relatively large amount of DDT used to control the Dutch elm disease vector has not decimated the bird population in Illinois.

Many of the recent newspaper and magazine articles concerning the possible detrimental effects of insecticides on wildlife are highly emotional, and frequently give only the partial facts which leave disturbing doubts in the mind of the public. In this regard, Norris D. Blackburn, professor of entomology at Pennsylvania State University, writes; "Statements linking certain insecticides, such as DDT, with various human diseases are indeed unjustified unless they are substantiated by adequate experimental evidence which thus far has been lacking. Entomologists would be among the first to agree that the effects of modern insecticides on wildlife and humans deserve

continuous investigation, but they also would be the first to demand that all statements regarding such effects should be based upon sound, experimental data."

Without a doubt, the use of DDT has been a dramatic experience for those in the field of insect control work. In thumbing through endless papers, articles, texts, and printed matter, I feel that here is one material that has had the scrutiny of many of the leading scientists of the world.

Experiences in the use of DDT have, indeed, been many and varied and, in my own case, I might state that without the benefits of this material my job would have more miseries and our elm population (of which we are so proud) would have been a thing of the past. Thirteen years of DDT spraying in Greenwich has never produced the dramatic catastrophes portrayed by some critics. Birds still migrate and sing and nest in our city and park elms. Fish still populate the streams and lakes of our park lands. Wildlife still is active. And personnel engaged in spray operations, in which DDT-drenched clothing is quite common, still man our equipment for 8 to 10 hours night and day, two to three months of the year, with no ill effects reported.

I see no more logic in eliminating all present spraying operations to avoid any hazard to people.
(Continued on Page 101)



Knapsack-Type Aid In Brush

by Frank E. Klitsch

Alpine Tree & Landscape Corp.
West Acton, Mass.

THE use of chemicals for control of brush has become an established practice along rights-of-way, watersheds, road-sides, and elsewhere. A reason for this is that the chemical industry has given commercial applicators a variety of specialized herbicides that fit different brush control situations, permitting increased efficiency and savings in manpower.

Greater efficiency in the use of the chemicals, themselves, however, is an important factor to be considered by applicators. Spraying equipment represents a substantial investment in machines which can be used only during a small portion of the year. Even the most versatile power equipment cannot get over all kinds of terrain, and a good deal of spray time often is lost in moving power sprayers from place to place and moving hoses out to a point where spray is to be applied.

Water supply also may be a problem in isolated areas. Conventional spray methods, in these areas, necessitate frequent trips for refilling high-volume sprayers.

All of these problems were present in a job Alpine Tree and

Landscape carried out for the Algonquin Gas Transmission Co., where Ammate X weed and brush killer were used along 90 miles of their pipeline running from Lexington, Mass., to Providence, R.I. This line runs through swamps and highlands, with substantial sections of the right-of-way virtually inaccessible to power equipment.

Although some brush cutting had been done before 1957 on the line, which is five to seven years old, nothing much had been done since. As a result, about 75 per cent of the pipeline right-of-way was covered with typical re-growth three to five feet high. In the swampy areas, predominant species were red maple and alder. In the highland areas, there were oak, birch, hickory, and some ash. Even though the right-of-way itself is more or less isolated, it is close enough to towns and farms so that the gas company had specified Ammate X weed and brush killer to avoid any liability problem from volatile injury to crops.

In considering the job, our company reviewed the experience of the Hartford Water Co., which

carried out a similar project a few years ago and used a mist blower—not a giant orchard sprayer—but the little knapsack-type blower powered by a gasoline engine. These units will give good coverage of brush at a distance of 12 to 15 feet from the operator. The Hartford Water Co., under the direction of Archie W. Paine, used eight pounds of a special formulation of Ammate weed and brush killer in two gallons of water with an ounce of spreader-sticker. This special formulation is the same as Ammate X without the sodium bichromate. Since their work was confined to metropolitan watershed areas, they were limited on what they could use in the spray mixture.

Since we did not have the same limitations, we economized on chemical by using Ammate X in an oil mixture in the mist blower. The use of an oil mixture to reduce the amount of Ammate X without reducing performance has been tried before. However, in these instances, the solution has been at rates of 40 to 50 pounds of Ammate X in 100 gallons of spray, for use in hydraulic sprayers. With

Blowers Control

a little experimenting, we found we could get a good mist mixture with nine times as much Ammate X in 100 gallons of spray.

The difference in the mixtures is clear from the following table:

Amount per 100 gallons

	<i>Hydraulic Spray</i>	<i>Mist Mixture</i>
Ammate X	40 pounds	360 pounds
Spreader-Sticker	6 ounces	1 quart
No. 2 fuel oil	4 gallons	5 gallons
Emulsifier	$\frac{2}{3}$ pint	1 pint
Add water to make 100 gallons		

The contract called for spraying 50 feet of right-of-way on the main pipeline and 30 feet of right-of-way on the laterals. We set our crew up at first with two men operating mist blowers and one man operating a nurse unit consisting of a jeep, trailer, and 100-gallon hydraulic sprayer, which was used for transporting and mixing the water and chemicals. We later increased the number of men on the job to five, and broke up into two crews served by the one nurse unit.

This 30-foot right-of-way belonging to the Algonquin Gas Transmission Co. of New England was treated with Ammate X concentrate, applied with solo mist blower. Photo was taken six weeks following treatment.



We found that 100 to 150 gallons of water was enough to keep the two crews operating all day, whereas, in our experience, it had taken 1,000 gallons or more to keep the same number of men operating with a hydraulic sprayer. It took about three months to do the whole 90 miles, or 308 acres.

Among the advantages we found in the concentrated mist application over the more dilute hydraulic spray were; it was possible to direct the spray application more carefully and to apply only the amount of spray mixture needed to cover the brush without runoff. Also, control of coverage is more accurate. On light, low brush, seedlings and more susceptible species, a broadcast sweep of the spray with the motor at half-throttle proved to be adequate. Full throttle proved necessary for penetrating thick brush, especially where there were more resistant species of maple, ash, and elm. The operators stood far enough from the brush to allow the mist to roll and spread—usually 10 to 15 feet. For dense brush, we sprayed from two sides for better coverage. Mod-

erate winds did not interfere with the mist application, but, as with almost any other spray application, we found that the crews had to stop when the wind got strong.

There were so few different species to be sprayed in this particular area that it was easy to train the operators to recognize the ones to be treated, so that they did not waste time or materials on weeds and low-growing species that did not need to be killed. As with most other foliage sprays, we found that the best results were obtained on the most uncomfortable, hot, humid days. Light rains at the time of application, or soon afterwards, however, did not seem to have any unfavorable results.

We have found it to be a good practice to take our operators back over the work a few days after application, and then again two weeks or more later, so they can see their errors and misses.

Obviously the mist blower is not likely to replace hydraulic, wheeled equipment where it is possible for the sprayer to move over the ground faster than a man can walk. But where the spray operation is limited to what men can do on foot, the program we used on the Algonquin Gas Transmission Co. contract offers a good deal of promise for similar jobs in the future. ★★

From a talk presented at the Northeastern Weed Control Conf., Jan. 6-8 in New York.



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'59 CALLED POOR YEAR FOR CROP SPRAYING IN ENGLAND

Extensive aerial spraying has not caught on in Britain so far, and aircraft operators cannot stay in business on any large scale unless they lengthen the annual flying time of their aircraft by arranging to carry out a large portion of their work abroad.

Other disadvantages include: the small size of the majority of farms; high hedges, trees, buildings, and electric pylons which abound on the island; and the absence of suitable landing strips near most farms. Livestock occupy some of the best sites.

by Arnold R. Barfield

Farm Intelligence Ltd.
London, England

CROP spraying from the air in the United Kingdom took a beating last year. From a record amount of aerial activity in 1958, the dry summer of 1959 cut the acreage of farm crops sprayed from the air by fifty percent. The reason is not difficult to find.

Aerial crop spraying in the U.K. is unbalanced; it does not rest on a firm foundation of regular demand. The use of planes is possible for a short season only—three months at the most, and possibly for as little as six weeks.

The bulk of all aerial spraying is one crop—the potato—and this for blight, a disease which is highly variable in its incidence.

The summer of 1958 in Britain was extremely wet, and, in this ideal condition, potato blight struck quickly and in many areas. Normally, more rain falls in the west of England than in the east, but 1958 was abnormal; eastern England saw the most rain and, because the bulk of England's potatoes are grown there, the most blight. Eastern England is also the region of large fields and flat farms, and these features had already attracted a number of aerial spraying contractors to set up their

headquarters there. When the blight came they were ready, and, while about 100,000 acres were sprayed from the air, some operators could meet only a portion of the demand.

The weather in 1959 was altogether different. Rain hardly fell between May and September, blight was minimal, and other fungal attacks appeared but rarely. Unfortunately, the heavy demand the year before had encouraged several new operators to enter the business, and others to expand their resources. The result has been that some have quietly sold out and others hang on a shoe-string, hoping for better luck this year.

One of the biggest companies in the business—Fison-Airwork—sprayed only 34,000 acres in 1959, compared with 66,000 acres in the previous year. This company is based in eastern England and was equipped with six Hiller helicopters in 1958. It has not expanded, nor plans to expand, its fleet any further, unless the length of season in Britain can be increased. However, as with other large spraying contractors, Fison-Airwork is confident that 1959 was abnormal,

that other years will bring conditions somewhere between the extremes of the last two, and that the scope for aerial spraying will expand.

The biggest fleet of aircraft for farm-spray work is operated by Crop Culture (Aerial) Ltd., whose headquarters are on an island off the south coast of England, the Isle of Wight. From this unpromising base this company flies 16 aircraft, all of fixed wing type. Their work, too, was cut in 1959, the acreage sprayed being only 57 percent of their total in the previous year, and there was never enough work on hand to occupy more than ten aircraft at any one time. While potatoes were only a small portion of the acreage treated in 1959, they still ranked first in importance. In order of acreage sprayed, other crops dealt with included: cereal crops (sprayed with trace elements), peas and beans (sprayed against insect and fungal attack), sugar beet (against the aphids which carry virus yellows), apples, pears, turnips, beets, and hops.

There is certainly a diversity of crops which can be usefully
(Continued on Page 109)

Florida Horticultural Spraymen Install Officers



Officers installed for 1960 by the Professional Horticultural Spraymen's Association of Broward County, Fla., are (left to right): Lee Horning, president; F. E. Benson, vice president; and Hugh Sherouse, secretary treasurer.

Second 4-State Conference

The second annual 4-State Aerial Applicators Conference is to be held at the Hotel Chinook in Yakima, Wash., Oct. 10 and 11. Norkem Corp. of Yakima is sponsoring the conference in cooperation with the Washington State Aeronautics Commission, Washington State University, and the Washington State Aviation Association.

Aerial applicators and interested persons from Oregon, Washington, Idaho, and Montana are being invited to attend.

Hahn 6-Row Boom Kit

Hahn, Inc., Evansville, Ind., has introduced an economy-priced six-row boom kit (Model 640-E). The boom is designed for the application of liquid fertilizers and features an aluminized-steel boom pipe. It can be used with all types of tractor sprayers.

Arizona Lists Directors

The Arizona Aerial Applicators Association, Litchfield Park, Ariz., has named directors from seven regions to serve instead of a regular slate of officers. A chairman, vice-chairman, and secretary-treasurer were elected from among the directors.

The districts and the directors are: Yuma, Orval McVey; Litchfield, John Neace, chairman; Phoenix, Cliff Crowl; Chandler, Robert Wachs, vice-chairman; Casa Grande, Virgil Koenig, secretary-treasurer; Toltec, Finnes Booker; and Marana, Harold Frost. The group

has 29 active members and three associate members.

Besler Air Carrier Sprayers

Besler Corp., Oakland, Calif., is offering two new air carrier sprayers that are reported to give exceptional penetration of spray material through increased revolutions per minute.

Model 450-6 is equipped with a 400 gallon tank and model 550-6 with a 500 gallon tank. Both models have thirty inch fans with

speeds up to 2,800 RPM. Further information is available from the company at 4053 Harlan St., Emeryville, Oakland 8.

Pest Control Course By Mail

Washington State University, Pullman, Wash., is offering a correspondence course in pest control. The syllabus of the course, "Principles of Pest Control," contains approximately 200 pages and covers such topics as: classification of insects; control methods, chemicals, and equipment; stored products pests; lawn and garden pests; fumigation; weeds; safety; public relations; and rodents.

The university also offers two other correspondence courses in agricultural entomology. One is offered for three college credits and the other is a non-credit course. Both are designed for those who have not had previous courses in entomology and should be of interest to both aerial and ground applicators.

Broadleaf Weeds Controlled With Helicopter Treatments

The control of broadleaf weeds on hilly barley and wheat fields near Atascadero, Calif. this spring, was achieved with 70 to 90 per cent effectiveness by helicopter spraying.

One and one-half pints of 2,4-D esters in five gallons of water per acre was used to treat 1,440 acres on Heilmann Bros. Ranch by Whirl-Wide Helicopters, Inc., Fresno, Calif. Two Hiller helicopters took part in the program. Top photo shows one Hiller hovering above Whirl-Wide's nurse rig while the new 305 hp Hiller 12E (on ground) prepares to take off with full load. The 12E is able to carry 100 gallons of spray material, enough to cover 20 acres.

Lower photo shows Hiller 12E spraying a slope. Farmers volunteered



their services as flagmen and the two helicopters completed project in 2 days.

Oregon Highway Spraying Up

Almost a three-fold increase since 1955 has occurred in dollar value of chemicals used for weed and brush control along Oregon's state highways, according to Bill Monner of the State Highway Department. Mr. Monner made the statement at a series of weed meetings last month sponsored by the highway department, Oregon State College and the Oregon Department of Agriculture.

Mark H. Astrup, highway landscape engineer, reviewed his department's chemical spray policy. "Briefly," he said, "our governing policy is to cut shrubs and trees prior to spraying. Indiscriminate foliage spraying is prohibited as is spraying with 2,4-D and 2,4,5-T on roadsides bordered by homes, gardens, and orchards."

A technical discussion of controls, built around use of soil sterilants, for weeds along public highways was moderated by Rex Warren of the Oregon State College extension service. Ray Kelso, herbicide control supervisor, Oregon Department of Agriculture, reminded the group that: "It is important for us to realize that we have a definite public relations angle in weed spraying. In fact, much of the state program of restrictions as embodied in the Oregon herbicide application law, boils down to good public relations." Mr. Kelso also said that in 1959 his office handled only four verified complaints against weed applicators and only one of them was against a licensed operator.

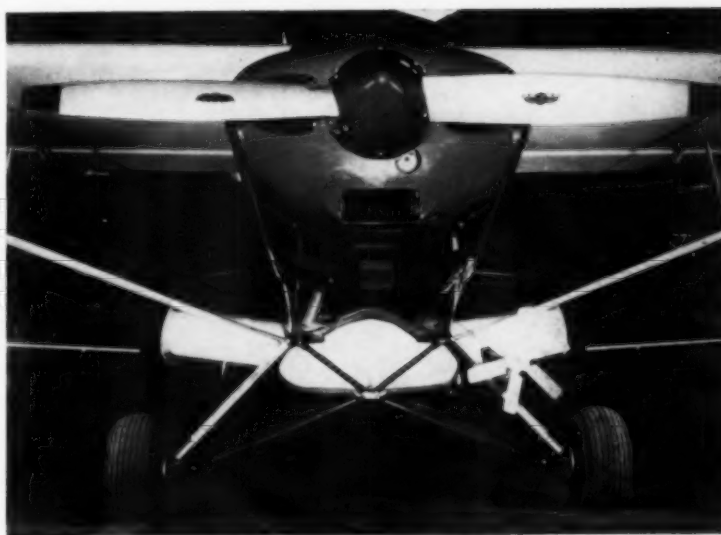
The weed sessions were held in eight eastern Oregon towns. Last year's meetings were held in western Oregon.

Adjustable Century Sprayer

A self-propelled, high clearance tractor for sprayers, dusters, granular applicators, toppers, and other attachments, which provides 100 inches of clearance under the rear axle and wheel spacing for 70 to 80 inch rows, is being offered by Century Engineering Corp., Cedar Rapids, Iowa.

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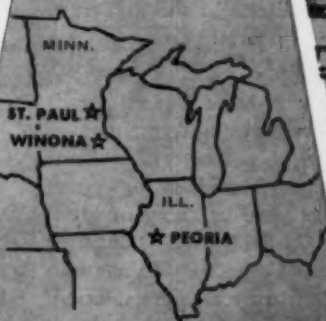
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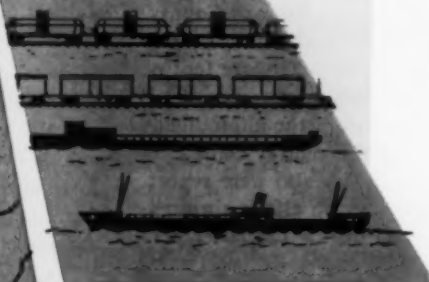
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PEST ROUNDUP

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Survey & Detection Operations, Plant Pest Control Division, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in U.S.D.A.'s pest surveys throughout the U.S.

By Kelvin Dorward



General Insect Activity On Rise In March

WEATHER conditions retarded insect activity to a considerable extent during early March but there was a noticeable increase by the latter part of the month. Although populations of the spotted alfalfa aphid were generally low in Arizona, infestations were increasing statewide by the latter part of the month. In Yuma County some alfalfa fields were heavily infested and considerable damage was being inflicted. Heavy infestations of the insect were reported on alfalfa in the Brazos River area of Brazos County, Texas. Light populations, with counts up to 20 per square foot of crown area, were noted in approximately one-half of the alfalfa fields surveyed in the central Oklahoma area. Pea aphids also were reported to be heavy on alfalfa throughout Arizona during the latter part of March.

Green peach aphids have been very abundant on potatoes in south Dade County, Florida, this season. Although populations have not been as high as in 1959, those present remained for a longer period of time. In Arizona, during late March, heavy infestations of the insect were present on weeds and flowers in the central part of the State. Populations were light on vegetables, but large numbers of winged forms were in the area.

Alfalfa weevil larvae were found infesting alfalfa, by mid-March, in Oconee and Hancock Counties, Georgia. Larvae also were found in South Carolina

fields. In Delaware, stalk examination revealed many eggs just hatched or on the verge of hatching. In western Nevada counties, adult weevil activity was on the increase, due to warm temperatures, and spraying had been completed by mid-March. By the latter part of the month, alfalfa weevils were active in Colorado, Idaho, and Utah. Infestations of the Egyptian alfalfa weevil were medium to heavy, and were damaging alfalfa in the Yuma Mesa area of Yuma County, Arizona. General, heavy infestations of the insect were found on alfalfa in the El Centro area of Imperial County, California.

By late March green peach aphids were causing severe damage to foliage of peach trees in Dona Ana County, New Mexico. Eggs of the insect were hatching in Mesa, Delta, Garfield and Montrose Counties, Colorado. Infestations of the San Jose scale were sufficient to cause damage to peach orchards in Nacogdoches County, Texas. In Yuma County, Arizona darkling beetles were numerous in vineyards and causing damage by feeding on the buds.

Boll Weevil Survival Up

Surveys by cooperating agricultural agencies, to determine the number of cotton boll weevils surviving the winter, have been completed in Louisiana, Mississippi, North and South Carolina, and Texas. The average number of live weevils per acre found in

woods trash in the three-parish area of East Carroll, Madison, and Tensas in northeast Louisiana this spring was 4,748—as compared with 2,246 in the spring of 1959. The percent survival rate for the area was 59, with an average of 8,097 live weevils per acre having been found in the 1959 fall hibernation survey.

During the 24 years that records have been maintained in Madison Parish, the number of weevils per acre (4,721) found surviving winter hibernation is the highest for the 24-year period. The percent survival for that Parish was 96, as compared with the 24-year average of 41.

In Mississippi, woods trash samples were collected in 4 areas, comprised of 4 counties each, to determine the number of cotton boll weevils that had survived. The average number of live weevils found per acre in the lower delta area was 1,088, compared with the 4,215 entering hibernation. In the central delta area the count was 1,353 live weevils as compared with the fall count of 8,513. Counts for the north delta area were 338 and 4,787; and the hill section, 504 and 2,991. The average of live weevils per acre of woods trash for the State was 821, compared with 464 in the spring of 1959 and 392 in 1958.

Boll weevil survival counts in North and South Carolina were made from surface woods trash collected from 4 areas in the two-state region. The average number of live weevils per acre found this spring in south central South Caro-

(Continued on Page 109)



Arcadian® News

Volume 5

For Manufacturers of Mixed Fertilizers

Number 5

How to Make Your Plant a Safer Place to Work

You can make your fertilizer plant a safer place to work. Take hazards out of production and build safety into your manufacturing processes!

Disregarding safety for the sake of production short cuts just isn't good business sense. It is imperative to protect your employees and yourself from accidents. Fortunately, the safe way is usually the most economical way to produce fertilizer.

Plan now to eliminate conditions in your plant that might cause costly accidents. Look at all phases of your operation—large and small.

Accidents can happen to anyone suddenly faced with an unusual situation—or, an injury may even occur during the performance of routine duties. For example, an old friend and frequent enemy of man—the ordinary ladder—is still a prime contributor to worker injuries. Ladders alone cause approximately 40,000 painful falls each year. Time lost on the job from ladder injuries can be serious and expensive for employee and employer alike. Fatalities are tragic.

Most accidents with men, equipment and materials can be avoided. Through only a little effort and cost, plant situations that might cause accidents can be foreseen and eliminated.

But this is only one phase of the safety problem. As chemical processing increases in fertilizer manufacturing,

more production hazards are created. To be safe, you should know what is going on, chemically, at all times in your plant.

Good safety records usually result from the following:

1. **Serious efforts to eliminate dangerous conditions in the plant.**
2. **Thorough training of personnel in safe work practices.**

It might pay you to carefully examine your own plant, keeping in mind the following check-list:

A. Many accidents are caused by poor operating conditions. Bad equipment or poorly-trained workers can lead to combining wrong ingredients that will bring real trouble. Some examples:

1. *Increasing the amount of acid to control ammonia fumes, when there is no good reason for these fumes.*
 2. *Use of abnormally high amounts of acid to obtain heat when some of this heat can be added in the dryer.*
 3. *Or, creating too much heat in the dryer to achieve results that could be partially or fully accomplished through safer channels.*
- (continued on following page)

Arcadian News for Fertilizer Manufacturers from NITROGEN DIVISION

HOW TO MAKE YOUR PLANT A SAFER PLACE TO WORK

(continued from preceding page)

4. *Allowing too many shields or ventilation that deprive the operator of a ready means to detect hazardous conditions.*

5. *Use of gas masks during all normal operating time. This may deprive personnel of distant or early warnings. There is something seriously wrong when regular operators are required to wear gas masks constantly. However, safety goggles should be worn everywhere throughout work periods.*

B. Proper respect should be given to actions of chemicals, heats and pressures on eyes, lungs and skin, as well as on metals, rubbers and organic materials. Common abuses are:

1. *Delaying medical attention for accident victims.*

2. *Handling acids without goggles and rubber gloves, or ammonia without gas masks.*

3. *Using low-pressure diaphragms with anhydrous ammonia.*

4. *Using rubber in gaskets, valve diaphragms and hoses that conduct sulfuric acid. Some synthetics are suitable for use with sulfuric acid, and the supplier should be consulted about their adaptability. Good grades of rubber are suitable for phosphoric acid.*

C. Applying high heat to equipment that has not been cleaned thoroughly can cause explosions. This carelessness still is a perennial source of accidents, some of them fatal.

D. Handling acids, particularly sulfuric acid, is dangerous. Detailed instructions are available from acid suppliers. They should be posted conspicuously in the plant, and followed to the letter. Some precautions are:

1. *Avoid all contacts with the body.*

2. *Get medical attention immediately when there is an accident.*

3. *Flush affected areas with clean water for at least 15 minutes.*

4. *Use water at low pressure for the eyes.*

5. *Always wear suitable goggles and headgear, preferably a safety helmet, around all acids. Add rubber gloves, full face shields, rubber safety shoes, and approved clothing when dangers are great.*

E. Sulfuric acid releases hydrogen when it reacts with ferrous metals. When this action takes place in a closed vessel or piping, very high pressures can develop. Hydrogen is also a serious fire and explosion hazard over a wide

range of mixtures with air. Some things to remember:

1. *Steel is a suitable material for handling sulfuric acid at and above 77% concentration (60° Be) with some exceptions.*

2. *Moisture added to the acid even from the air will greatly increase its corrosive power.*

3. *Corrosion of steel piping is greatly increased when the velocity of sulfuric acid in the piping exceeds 10 feet per second, or about 9 gallons per minute in 1½ inch extra-heavy steel pipe.*

F. Furnaces cause many accidents. Establish safe starting and shutdown, particularly for gas furnaces.

G. It is unsafe to have large quantities of acid under pressure in the plant. Use pumps instead of air pressure.

H. Watch out for the release of dangerous chemicals in large volume. Use safe hose connections that are usually not quick-acting.

I. Exercise care in the combination of combustible materials, including mixed fertilizers.

J. Practice good housekeeping:

1. *Build guards around all chains, gears, belts and exposed moving parts.*

2. *Insulate wiring and guard light bulbs.*

3. *Disconnect piping of dangerous materials for repair work.*

4. *Use lock-outs, interlocks and remove fuses of electrical equipment for repair work.*

5. *Maintain adequate lighting.*

6. *Keep ladders in good condition, and see that employees are trained in their use.*

7. *Maintain enough pressure gauges in proper condition.*

8. *Have safety valves in good working order, and placed correctly.*

9. *Keep your gauge glasses guarded.*

10. *Locate overflow and discharge devices safely.*

11. *Maintain escape routes for personnel.*

12. *Provide a safe means for obtaining samples.*

13. *Make sure tank cars can be connected safely.*

14. *Keep floors as dry as possible. Post signs to warn employees about wet, slippery floors.*

Now is a good time to check over your manufacturing operation to see if your plant is a safe place to work. You probably will discover some ways to produce fertilizer more efficiently and at lower cost. However, remember to look carefully at all attractive short cuts. They could be dangerous!

4-H CLUB and F.F.A. ACTIVITIES sponsored by Nitrogen Division

5 YEARS with 4-H

Nitrogen Division marks 1960 as the fifth consecutive year of sponsorship of the National 4-H Field Crops program. During that time approximately TWO MILLION young men and women learned modern farming skills through participation in the Field Crops program. These young people kept detailed records of expenditures and cultural practices, ran comparison tests, and worked always to "make the best better." The National Committee on Boys and Girls Club Work, located in Chicago, acts as the liaison agency between donors and the Federal and State Extension Service, which operates the program. As a donor, Nitrogen Division provides six \$400 scholarships to the national winners, all-expense trips to the annual 4-H Club Congress to state and national winners, and a maximum of four gold medals to county winners. In addition, the Division helps finance efforts to

enroll more members in Field Crops, and is hard at work revising the local leaders' manual to place more emphasis on soil fertility testing.

7 YEARS with F.F.A.

Nitrogen Division has contributed to the Future Farmers of America Foundation for seven consecutive years. Division headquarters in New York is always a principal stop on the annual good-will tour of the national officers of FFA. This year the officers demonstrated keen interest in an illustrated talk by Dr. Harvey Stangel, chief agronomist for Nitrogen Division. This farm youth group, with a current membership of 380,000, is open only to boys studying vocational agriculture in high school. The FFA and the vocational agriculture program are administered by state departments of education and the U. S. Office of Health, Education and Welfare.

John Coverdale (left), president of the National Committee on Boys' and Girls' Club Work, presents National 4-H Donor Merit Award to Jacob White, president, Nitrogen Division, Allied Chemical. The award denotes 5 years' sponsorship in the National 4-H Club Field Crops Program.



The six national 4-H Field Crop winners line up with an oversized loaf of bread showing the share of the consumer's bread dollar that is paid to the grower of the grain. Each of the winners received a \$400 college scholarship from Nitrogen Division, Allied Chemical.



National officers and advisors of the Future Farmers of America were guests of Nitrogen Division in New York on their annual good-will tour of the U.S. With the boys are Jacob White, president, Nitrogen Division, Allied Chemical, and Frank J. French, president, General Chemical Division.



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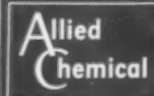
NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	urea	Water		Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Van. Press. at 104°F per Sq. In. Gauge
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

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LISTENING POST

This department, which reviews current plant disease and insect control problems, is a regular feature of AGRICULTURAL CHEMICALS. The comments are based on observations of collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, USDA, Beltsville, Md.

By Paul Miller



Control of Cabbage Clubroot in Western North Carolina

CLABROOT (*Plasmodiophora brassicae*) of cabbage in the mountains of western North Carolina furnishes an example of the complications that can arise in the actual use of even thoroughly tested control measures. According to N. N. Winstead and H. R. Garriss (5), of North Carolina State College, the disease causes serious commercial losses, but the recommended soil treatment with lime and calomel cannot be used because it produces soil conditions that are unfavorable to potatoes, another important crop in the region. These workers obtained promising results in trials with pentachloronitrobenzene (PCNB) applied by different methods, especially in a solution used to water the plants at transplanting time. Control obtained varied with the type of cabbage planted. It was much less effective on long-season susceptible varieties, such as Oakview, the variety most commonly grown in western North Carolina, than on shorter-season kinds, such as Badger Market, which, even in heavily infested soil, generally produced a successful crop of marketable heads in treated plots. The amount of club root that developed on roots was not a true indication of the value of PCNB treatment, according to Winstead and Garriss. At harvest time, susceptible varieties were very heavily attacked, whether treated or not and regardless of rate or method of application; nevertheless treated plants were much superior in top growth and heading to untreated plants. Win-

stead and Garriss consider that PCNB treatment combined with proper crop rotation should permit successful production of even long-season varieties such as Oakview on clubroot-infested soil.

The beneficial effects of soil treatment are obviated if infected seedlings are transplanted into the treated soil. The causal organism is spread, also, into previously uninfested fields by transplants grown in infested seedbed soil. So much of the soil in this North Carolina mountain region has become infested in this manner that very little clubroot-free soil is available for growing seedlings. Winstead and Garriss found that treatment of plant beds with methyl bromide effectively controlled not only clubroot, but also wirestem (*Rhizoctonia solani*) and weeds.

Reduction of Decay

Reduction of decay in polyethylene-packaged anjou pears by post-harvest fungicide treatment is important because the high relative humidity of the air around fruit packed in polyethylene box liners is very favorable to the development of various rots. C. F. Pierson (3), of the United States Department of Agriculture, Agricultural Marketing Service, reports the results of 3 years (1956-1958) of trials designed to find an effective and safe fungicide for postharvest treatment to reduce the amount of decay in Anjou pears grown in the Pacific Northwest. N-trichloromethylmercapto-4-cyclohexene-1,2 (captan), n-trichloro-methylthio-

phthalimide (Phaltan), and sodium-o-phenylphenate (Stop-Mold) were about equally effective. Dehydroacetic acid-sodium salt (DHA-S) did not give satisfactory control. Treatment with Stop-Mold must be followed by rinsing with clear water to prevent injury to the fruit. Captan and Phaltan do not cause injury at recommended concentrations and can be used without a rinse. Both of these materials are formulated as wettable powders and require the use of mechanical agitators to keep them in suspension during treatment. According to Pierson, Phaltan cannot be used commercially for post-harvest application because a residue tolerance has not been established for it.

Control of Rusty Spot

Perhaps the most important outcome of the experiments on the control of rusty spot of peach fruit, reported by Robert H. Daines and colleagues (1), of the New Jersey Agricultural Experiment Station, is the strong support given to the suggestion that the trouble is caused by a powdery mildew fungus. The circumstances noted rather implicated apple powdery mildew (*Podosphaera leucotricha*), at least in the occurrences observed. In the trial plots, rusty spot was not uniformly distributed. It was abundant on peach fruit in the first four or five rows next to an apple orchard infected with powdery mildew, but rows farther from the apple orchard showed progressively smaller amounts of rusty spot. Of the various materials tested.

(Continued on Page 106)

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WASHINGTON REPORT

By Donald Lerch



FARMERS are likely to hear and see more about safe use of pesticides this season than ever before in history. NAC's highly successful transcribed series will include four special talks on safe storage, safe use, and protection of children against accidents from misuse.

USDA has come along with three easy-to-read leaflets on "It pays to use chemicals safely." These are going to field crops, vegetable and livestock producers. And the Farm Division, National Safety Council, with the cooperation of NAC, is promoting the "read the label and follow directions" idea through all farm safety outlets this year.

Behind this effort is the pesticide industry's high degree of public responsibility not only for producing chemicals that can be used safely and beneficially, but in educating users in their safe use. These days industry is giving away a free course of education with every label.

* * * * *

While operating under a sort of "Cape Canaveral" secrecy, the President's Committee to study the effects of pesticides in agriculture may take much the same position as the major farm organizations and the pesticide industry is taking.

The reason is simple. The overwhelming preponderance of logic and scientific fact demonstrate that the key to the safety of chemicals in our food supply rests upon the carefulness of the user. Safe use, in many people's minds here, is the real key to solving several major industry problems.

Despite general optimism about a good season for sales in 1960, many top-level pesticide industry leaders are concerned by a downward trend in basic research.

This view was reflected during USDA's Symposium on "The Nature and Fate of Chemicals Applied to Soils, Plants, and Animals" in Beltsville, a few days ago (April 27-29). Some companies already have cut back or have cut out research, according to reports there. In the process, a number of promising pesticides have been dropped from development.

Those noting this trend also made a plea for continued basic research. They pointed out that pesticides are essential to protect crops, maintain food quality, and lower unit costs of production, and warned that any reduction in research now may hit us hard 10 to 20 years from now when we'll have 50,000,000 more people to feed.

* * * * *

Russians, on the other hand, appear to farm leaders here to be plunging into greater use of both fertilizers and pesticides to boost their farm production. During a visit to Beltsville last September, Soviet Premier Nikita Khrushchev told Agriculture Secretary Ezra Taft Benson "We are quite a way behind you in plant science because we lack the agricultural chemicals we need."

In December 1959 the U.S. signed an agreement to receive a group of Russian experts in these fields, and, we have learned, the Russian group is now expected for a 20-day tour of USDA and State

Experiment Station facilities in June.

It's all still tentative, but plans are to take the Russian experts to Beltsville, to Cornell, the New York Agricultural Experiment Station, the Illinois Agricultural Experiment Station, the Missouri Agricultural Experiment Station, USDA Stations in Stoneville, Mississippi, and Brownsville, Texas, and to the giant TVA.

The Russians will be shown the use of fertilizers and pesticides in the U.S. and told how information about them is disseminated to farmers, if present plans work out. Both the National Plant Food Institute and the National Agricultural Chemicals Association will have a chance to meet the Russians when they are in Washington.

* * * * *

So far this has gone practically unnoticed, but Congressman Leonard G. Wolf, of Iowa, has tossed what some people here are calling a "Chemical Pesticides Coordination Act" into the hopper.

His bill—H. R. 11502—would provide that no officer or agency of the Federal Government can start or aid any program involving the use of pesticides until after he has consulted with the U. S. Fish and Wildlife Service and "with the head of the agency exercising administration over the wildlife resources of each state to be affected by the program."

This bill is a sleeper and has a chance of getting through Congress because it has been referred to the House Committee on Mer-

(Continued on Page 103)



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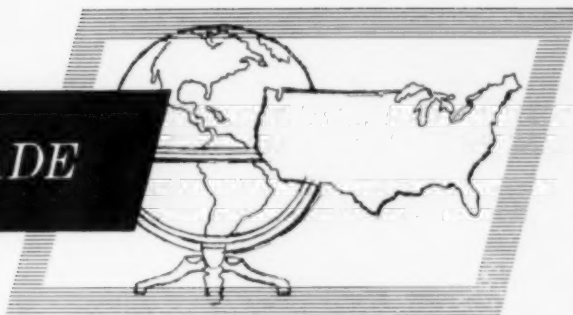
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NEWS about the TRADE



Two New NAC Board Members

S. H. McAllister, manager of the Agricultural Chemicals Division of Shell



S. H. McAllister



F. C. Shanaman

Chemical Co., New York, and Fred C. Shanaman, Pennsalt of Washington Div., Pennsalt Chemicals Corp., Tacoma, Wash. were elected recently to the Board of Directors of the National Agricultural Chemicals Association.

The two were elected to fill vacancies created by the retirement of Arthur W. Mohr and resignation of Even T. Collinsworth.

New Ammonia Plant in Joplin

A new chemicals plant will be built near Joplin, Mo., by Solar Nitrogen Chemicals, Inc., according to a joint announcement by Standard Oil Co. (Ohio) and Atlas Powder Co., which are co-owners of Solar. Completion of the plant is scheduled for the end of 1961.

The plant, which will produce anhydrous ammonia, urea and related products will be operated by Atlas. The plant's production will be marketed by Sohio Chemical Co.

Fire-Ant Plan Opposed

The National Wildlife Federation has asked Congress to stop or modify drastically the Department of Agriculture's fire-ant control program.

The President's budget included \$2,400,000 for the program. The federation asked that it be eliminated. Louis C. Clapper, acting conservation director, told a

House Appropriations subcommittee recently that, if the funds were not taken from the budget, Congress should specify that the money could not be used for "aerial broadcasting of the potent chemicals."

Aerial Demo on 2,4,5-T

Stull Chemical Inc., San Antonio, Tex. is planning a field day for May 6th at Hurt Airport, San Antonio to demonstrate aerial application of an invert emulsion of 2,4,5-T.

IMC Expects Record '60 Net

Thomas M. Ware, president IMC, announced recently that the corporation expects to report a record net for the year ending June 30th. The company expects a 15 to 20% increase over 1959's \$6,189,422. Sales, according to Mr. Ware, are also expected to establish a record at about \$120 million, compared with 112.5 million in fiscal '59.

Mr. Ware said that IMC's production of phosphate and potash is "sold out" through the remainder of fiscal 1960, with outside purchases of potash being made to meet customer demand. In a year from now, IMC hopes to mine potash deposits in Saskatchewan, which have been under development for the past three years.

New Fertilizer Plant

Evergreen Dehydrating Co., Seattle, Wash. was recently incorporated by Ray Parcher, George Chandler, Jr., and A. L. Chandler, all of Seattle. The firm will manufacture and distribute all types of fertilizer.

Eastern States Name Change

Signal Oil and Gas Co. has changed the name of its Eastern States Petroleum and Chemical Company division to Houston division. R. N. Blaize, who was president of Eastern States Petroleum & Chemical Corp., before it merged with Signal in September, 1959, will continue to head the Houston division as a vice president and director of Signal.

Reduced Earnings at Spencer

Spencer Chemical Co. announced that unusually severe weather in the quarter ending March 31 delayed the movement of fertilizer, resulting in reduced earnings for the quarter. Return of normal weather was reflected in a sharp rise in sales during April.

To Make Nitroform in West

Hercules Powder Co. has announced plans to start manufacture of "Nitroform", at its plant in Hercules, California, sometime before the end of 1960. The synthetic organic fertilizer is currently made at Woonsocket, R. I.

TVA Fertilizer Program Hit

The Chamber of Commerce for the United States last month called for an end to the fertilizer business being conducted by the Tennessee Valley Authority. TVA had asked Congress for \$3,339,000.

In a letter to the House Appropriations committee, the national chamber said that the fertilizer production and test program, for which the money was requested, "constitutes an unwarranted commercial enterprise conducted by this government agency."

General Names Damon

John L. Damon, previously agricultural chemical sales manager, has been

named director of agricultural chemicals by the General Chemical Division of Allied Chemical Corp., New York. Mr. Damon, who has been with the division for 24 years, has assumed direction of all activities related to the division's agricultural chemical products, including sales, purchasing, manufacturing, and research.

Mr. Damon served in sales, technical service, and engineering capacities prior to becoming manager of agricultural chemical sales in 1954.



New Collier Fertilizer

A new nitrogen and zinc fertilizer marketed under the name, "Brea Brand Aqua-Z" is being manufactured and distributed by Collier Carbon & Chemical Corp., Los Angeles. The product is described as aqua ammonia solution with zinc as a minor element.

Sales Clinic Nov. 14

The annual sales clinic conducted by the Salesmen's Association of the American Chemical Industry will be held Nov. 14 at the Hotel Roosevelt in New York.

Announce Canadian Meeting

The eighth annual meeting of the Canadian Agricultural Chemicals Association will be held at the Britannia Hotel, Lake of Bays, Muskoka, Ontario, Canada, on September 12-14, 1960.

The program will include a report on "Evaluating New Pesticides", by F. Glen, Canada Dept. of Agriculture; "Insect Resistance"

by A. W. A. Brown, Western Univ.; "Tariff Reference 120" by J. A. Davis, Chemical Industry Tariff; "Selling and Advertising" by L. F. Czufin, Calspray.

W&D Appoints Rauchfuss

H. A. C. Rauchfuss has been appointed chairman of the board of Woodward & Dickerson, Inc., Philadelphia, and C. Earl Gettinger has been named president.

To Build In E. St. Louis

The General Chemical Division of Allied Chemical Corp., New York, plans to build a large phosphoric acid plant at its East St. Louis Ill., works. The plant, with a projected capacity of 50,000 tons per year of wet process phosphoric acid, is scheduled for production early in 1961.

Thuricide Registered

Thuricide, a microbial insecticide offered by Stauffer Chemical Co., New York, has been granted Federal registration and exemption from a tolerance requirement. The Food and Drug Administration has announced that Thuricide may be used on twelve food crops and on tobacco.

Label registration is being sought for two formulations—Stauffer Thuricide wettable powder and Stauffer Thuricide dust.

National To Erect Plant

National Phosphate Corp., is planning to build a phosphoric acid plant at Marseilles, Ill. The plant is expected to have the highest capacity in the midwest.

Named Operations Manager

Mervyn A. Upham has been named operations manager for International Minerals & Chemical Corp.'s potash mine in Canada.



IMC is sinking a 3,100-foot shaft near Esterhazy, Saskatchewan. Mr. Upham, who has been associated with underground mining operations in Canada for 14 years, was mine manager of Rio Tinto's Milliken Lake uranium mines and plant before joining IMC last March.

Mr. Upham succeeds Merton I. Signer, who directed the initial phase of the Esterhazy mine development. Mr. Signer recently joined IMC's long-range planning division at Skokie, Ill.

CFA Meeting Held April 11th

The 8th annual California Fertilizer Conference was held April 11 and 12th at Fresno State College, Fresno, Calif. Discussions dealt primarily with phosphate fertilization, — ranging from a review of the origin of phosphates in western states to a report on "prediction, production and profits from phosphates on cereals".

J. H. Nelson and E. R. Mog, both of Stockton, Calif., were co-chairmen of the conference.

Plant for West Canada

Interprovincial Co-operatives Ltd., Winnipeg, Canada, plans to build Western Canada's first basic chemical pesticide plant this year in the Alberta-Saskatchewan area.

Geigy Names N.W. Sales Head

Larry Harman was named sales manager of the northwest sales district by Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Ardsley, N. Y. With Geigy since 1947 as a sales representative, Mr. Harman's headquarters are at Walla Walla, Wash.

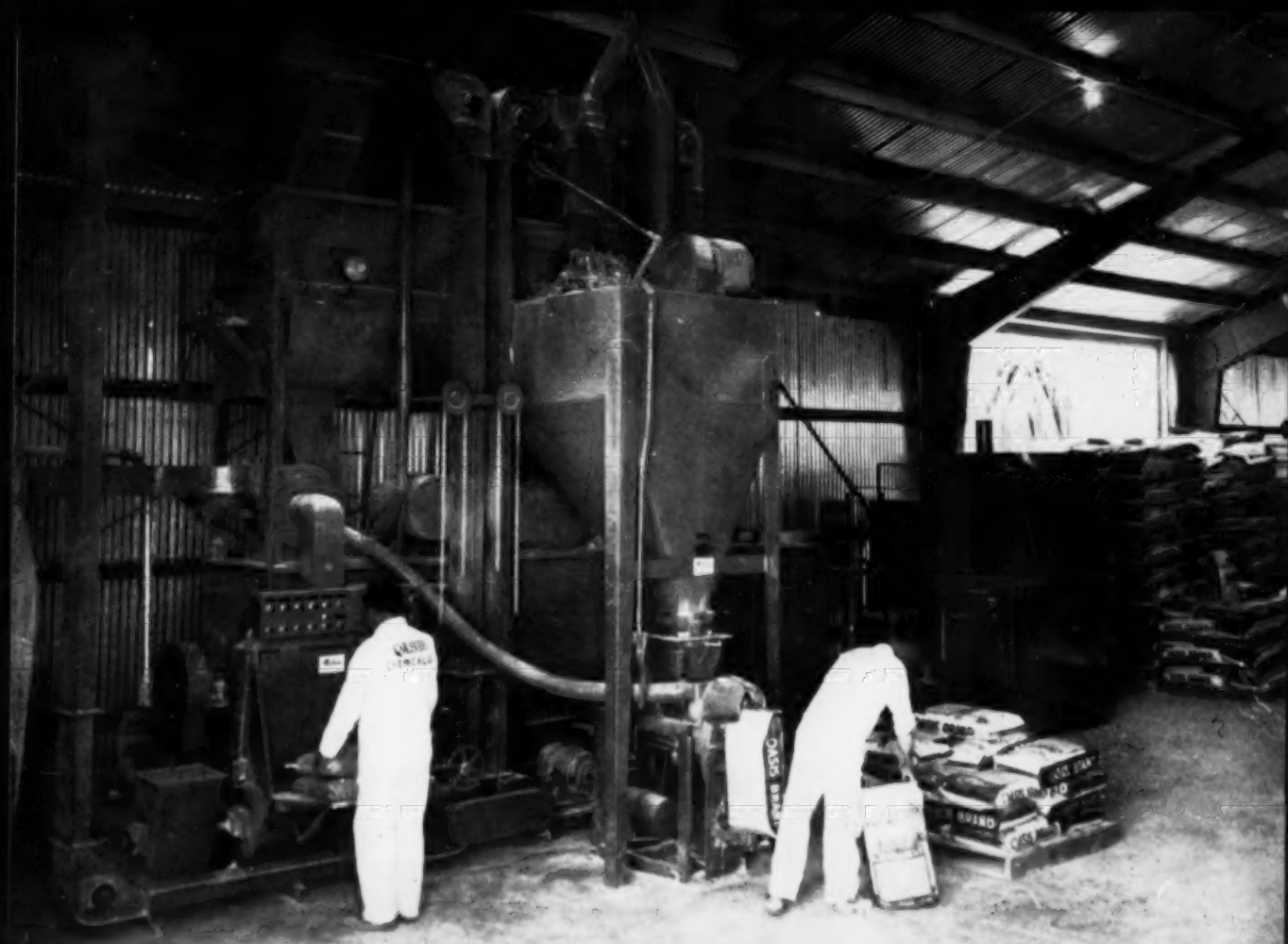
In other moves announced by the company, Roger Scott of Geigy's research staff in Ardsley has been named field research representative in the Pacific northwest. His headquarters are at Yakima, Wash. Also located in Yakima is Gus Poletis, who recently joined Geigy after resigning from Calspray, Colo.

Valley Nitrogen Producers' Plant In Operation

The new ammonium phosphate and wet process phosphoric acid plant of the Valley Nitrogen Producers, Inc., Helm, California, recently went into production.

The plant was engineered by the J. C. Carlile Corp., Denver, Colo. It has a capacity of about 75,000 tons of fertilizers.





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Mathieson Chemical Corp.	Phoenix, Arizona
Niagara Chemical Div. (FMC)	Richmond, Calif.
Miller Products Co.	Portland, Ore.
Stauffer Chemical Co.	Richmond, Calif.
American Potash & Chemical Co.	Los Angeles, Calif.
Cotton States Chemical Co., Inc.	West Monroe, La.
Pennsalt Mfg. Co. of Wash.	Portland, Oregon
Thompson-Hayward Chemical Co.	Lubbock, Texas
Tide Petroleum Prod. Co.	Edenburgh, Tex.
Diamond Alkali Co.	Cleveland, Ohio

EXPORT

Pennsalt International Corp.	Mexico City
Stauffer de Mexico, S.A.	Culiacan, Mexico
Niagara Chemical Division	Culiacan, Mexico
Tropical Agriculture, S.A.	Havana, Cuba
Geigy do Brasil, S.A.	Rio De Janeiro, Brazil
DuPont (Peru) S.A.	Callao, Peru
Compania De Petroleo Shell de Columbia	Barranquilla, Colombia
Allied Chemical Services Ltd.	Calgary, Canada
Aliaqua Commercial De Anilinas	Sao Paulo, Brazil
Bayer Agro Chem Corp.	Bombay, India

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.....
Total Service?**

Some people hold that "potash is potash," "triple is triple" and "rock is rock" — that fertilizer ingredients are the same regardless of source. We don't agree. We think it is reasonable to expect a *better* product from the supplier who has a penchant for quality control and effi-

cient production. Moreover, we think the *extra* services offered by materials suppliers vary appreciably — that these *extra* services make a big difference in suppliers. Listed below are the *extra* services offered you by IMC.

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27-60

MAY, 1960

79

New Jersey Plant Food Society Elects Directors

The newly-formed Plant Food Educational Society of New Jersey elected eleven men to its board of directors at an organizational meeting April 8 in Trenton. The society was formed by representatives of Rutgers University, New Brunswick, and members of the plant food industry.

Directors shown are: Seated (l. to r.) Jim Carrol, Chamberlin and Barclay, vice president; Stacey Randle, N. J. Experiment Station, secretary; Graham Campbell, Independent Mfg. Co., president; Chas. A. LuBow, Star Fish & Bone Fert. Co., treasurer; and Jack Dantine, Baugh and Sons Co.

Standing (l. to r.) are: Jack Litzel-



man, G.L.F.; Bob Lenhart, Potash Co. of America; William Reid, American Cyanamid Co.; Howard Stark, Limestone Products Corp. of America; and Ken Hall, Nitrogen Division, Allied Chemical Corp. Not pictured is Jack Satterthwaite, Reed and Perrine.

Florida Enforces Spray Rules

Regulations governing the use of pesticides on lawns and shrubbery by commercial spray operators went into effect in Florida on May 1. The new regulations, passed by the Florida State Board of Health, Feb. 9, provide for the issuance of permits to commercial spraymen.

Home owners are expected eventually to be placed under the regulations and may be forbidden to use toxic insecticides unless they first obtain a permit.

Calls Aminotriazole Valuable

Aminotriazole not only is not carcinogenic but may even be of value therapeutically in hyperthyroidism, according to Dr. E. B. Astwood, professor of medicine at Tufts Medical School, Boston. He said that the so-called carcinogenic action of aminotriazole and related compounds in rats results entirely from the antithyroid effect.

Dr. Astwood, whose remarks were contained in a letter to the *Journal of the American Medical Assn.*, in the March 19 issue, said that no known antithyroid compound has ever been implicated in the induction of cancers elsewhere in the body, even when fed to rats or mice in large doses for a long time.

"Before the cranberry episode" Dr. Astwood and his associates were looking for an antithyroid compound that would have a longer duration of action than those currently in use for the treatment of hyperthyroidism. They found that a single oral dose of 100 mg. aminotriazole inhibited radioiodine uptake by the thyroid of normal and thyrotoxic subjects for 24 hours, which suggests that therapy with one dose per day is a possibility.

Should experience show the compound to be well tolerated, Dr. Astwood said, we will be faced with the anomalous situation that an effective remedy suitable for human use is banned from use in killing weeds.

Non-Farm Fertilizer Survey

Consumption of commercial fertilizer by non-farm households in the Middle Atlantic States for the year ended June 30, 1959, appears to have been about 219,000 tons. As a result, the mean fertilizer consumption per non-farm household in the region is estimated to have been approximately 39.1 pounds.

These figures are based on a sample survey of 1,873 homes scattered throughout the area. Report-

ed by the National Plant Food Institute, the data were collected by personal interviews and later adjusted to the extent necessary to compensate for imperfect sampling.

Total retail value of the fertilizer used by non-farm homes in the area surveyed (New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, and West Virginia) was approximately \$20,872,000, of which mixed fertilizer accounted for \$14,790,000. As was the case in a previous study of New England, fertilizer use on lawns accounted for well over half of the total consumption.

Dow Sponsors Study Tours

A study tour scholarship program for county agricultural agents, sponsored by the Dow Chemical Co.'s agricultural chemicals department, will start this summer. Leading county agents from each of the United States will take part in tours of approximately three weeks' duration.

The tours will include visits to marketing enterprises, outstanding farm operations, successful extension service programs, and research projects.

Few Study Farming

The Department of Agriculture reported last month that only 31,000 out of 411,000 students in United States agricultural colleges are studying to be farmers. The department supplied the figures after a request from a House Appropriations subcommittee headed by Representative Jamie L. Whitten, Democrat of Mississippi.

Representative Whitten said that the number of farmers constantly is dropping while their operating costs continually rise. "In my judgment," he continued, "it is fearful when American youth sees so little chance in the field of agriculture that only 31,000 out of 411,000 students registered are interested enough to study agriculture." There was no testimony on what the other students were studying.

Vulcan-Associated Names Two

David W. Lynch (left) has been named general sales manager and Donald R. Hoover (right) has been ap-



Lynch



Hoover

pointed assistant sales manager by Vulcan-Associated Container Companies, Birmingham, Ala.

Mr. Lynch had been sales manager-national accounts for Vulcan Steel Container Co., an associated company. His offices are at Birmingham.

Mr. Hoover, whose office is at Bellwood, Ill., formerly was associated with Vulcan Containers, Inc.

Microbial Pesticide OK'd

The Food and Drug Administration has given its tentative approval to the first of what is expected to be a series of microbial pesticides. An exemption from the tolerance requirements of the Miller Bill was granted for the micro-organism *Bacillus Thuringiensis* Berliner.

The pesticide is being offered for use on alfalfa, apples, artichokes, beans, broccoli, cabbage, cauliflower, celery, cottonseed, lettuce, potatoes, and spinach.

Nitrogen Division V.P.

William H. Van Beck has been appointed a vice-president of the Nitrogen Division of Allied Chemical Corp., New York. He also is division comptroller.

Potash Expansion Assured

Saskatchewan has deposits of high grade potash which are adequate for development to meet expanding markets in the future, according to the Stanford Research Institute's economic report to the province.

The Saskatchewan potash reserves are so great that they could supply the current demand of the entire North American continent for the next 2,000 years, the report estimates. Recoverable reserves of potash are estimated at 4,000,000,000 tons, although the total re-

serves are more extensive. The potash mine at Patience Lake is capable of producing 1,600 tons of high grade potash a day. A second mine of the same size is being developed at Esterhazy. The report said that the long-term growth of potash is accepted as certain, in spite of the fact that the present market is characterized by over-expansion.

DDT Micronizer To India

For the second time in two years, Sturtevant Mill Co., Boston, will supply DDT formulating equipment for Hindustan Insecticides (Private) Ltd. of India. A contract has been awarded for a 24-inch Micronizer fluid energy grinding mill, dust collector, screen, and secondary grinding mill to Sturtevant.

Russians Set Optimistic Fertilizer Production Goal by '65

CONTROL figures for the Soviet Union's current Seven Year Plan call for a tripling of the 1958 output and use of mineral fertilizer by 1965. Success in the fertilizer program is seen as a key to achieving the ambitious goal of increasing gross agricultural production by 70 per cent during the years 1959-'65.

The planned growth of agricultural output during the current Seven Year Plan is to be based on expansion of crop acreage and high crop yields. In recent years, much of the growth in agricultural production has resulted primarily from expansion of crop acreage. The scarcity of additional suitable land and the high costs of reclamation, however, are causing Soviet planners to devote more attention to better farming techniques.

The production of mineral fertilizer in the USSR is to increase from 12.4 million metric tons in 1958 to 35 million metric tons in 1965. The output will rise rather modestly during the early years of the Plan period but, by 1965, the annual increment to production is expected to be more than four times as great as in the early years, as new factories are brought into production and existing factories modernized.

Natural gas is to be used extensively as a raw material for the production of nitrogen fertilizers and the exploitation of rich potash deposits in the Urals is to be stepped up. As in the past, most of the output will be in the form of low-quality straight fertilizers. It has

been reported, however, that "to free the transport system from the shipping of useless ballast in low-analysis fertilizers" the production of concentrated fertilizers will be initiated. Also, the production of granulated nitrogen and phosphorous fertilizers will be expanded.

The use of liquid nitrogen fertilizers in the USSR has been limited largely to the irrigated cotton-growing regions of central Asia. However, the use of these fertilizers is expected to expand considerably during the period under consideration.

On the basis of what has happened in the past, it appears unlikely that the Soviet Union will achieve its fertilizer production goals. In the preceding Five Year Plan, the mineral fertilizer goal was set at 19.6 million metric tons by 1960. In the current plan, the yearly goal for 1960 was scaled down to only 13.5 million tons, despite the importance attached to greater fertilizer production.

According to G. Stanley Brown, writing in the March 1960 issue of the publication *Foreign Agriculture*, the Soviet Union may not triple its 1958 output by the end of the Plan, but it certainly will raise it considerably—probably as much as double. This amount of fertilizer would contribute substantially to the Soviet drive to raise agricultural production, but, in terms of utilization per sown acre, it would mean that the Soviet Union in 1965 would be using less than half the amount the United States was using ten years earlier.



We grow good peanuts in North Carolina, and I give lots of the credit to Terraclor. I got some of the best peanuts I ever made where I used it for stem rot.

Here on Long Island, we're growing healthy cabbage now that we're using Terraclor in the transplant water.



We county agents have been running a lot of stem rot tests on Georgia tomatoes, and you could tell to the row where Terraclor was left out of the transplant water.



Like most Arizona cotton farmers I'm all for Terraclor. There's nothing like it for controlling damping-off.



Terraclor has really done the job on beans for root and stem rot. It's meant improved stands and increased yields all over California.

I'm a cotton pathologist. I can tell you that down here in Texas, soil fungicides return many times the investment.





Men who know are saying...

Terraclor®

SOIL FUNGICIDE

*Gives protection, bigger yields,
greater profits*

Terraclor pays off on:

COTTON: 25-30% of total disease losses are caused by seedling diseases. Replanting costs \$5-15.00 per acre, plus loss of pre-emergence herbicide previously used. Terraclor may increase yields and return the grower more than 15 times his investment through uniform stands of better grade cotton.



CABBAGE, CAULIFLOWER: Severe club root infection can take a field out of crucifer production entirely. Terraclor control has provided 3-5 ton per acre increases for a return of 10-30 times the investment. Terraclor also controls black root or wire stem.

PEANUTS: Faced with the threat of a 50-60% crop loss, growers can realize Terraclor-increased yields of as high as 350-500 lbs. per acre of clean peanuts - free from soil. This return is many times the cost of the chemical invested for control of stem and root rot (Southern blight).



BEANS: Root and stem rot losses run as high as 30-40%. Terraclor may increase yields by 200-300 lbs. per acre and return growers 10-15 times the cost of treatment. Terraclor also controls white mold.

TOMATOES, PEPPERS: Stem rot (Southern blight) can cut production 30-60%, depending on severity. Terraclor treatment can return 10-20 times the investment by increasing yields $\frac{1}{3}$ to $\frac{1}{2}$.



LETTUCE: Growers have lost 25-50% of their crop to leaf drop and bottom rot. Terraclor may increase yields by $\frac{1}{2}$ for a profit far exceeding the chemical cost.

Also:

POTATOES (Scab, Rhizoctonia)
WHEAT SEED (Common Smut or Bunt)
GARLIC (White Rot)
ALFALFA, CLOVER (Crown Rot)
FORMULATORS — Get complete information on Terraclor for control of soil-borne diseases. Terraclor is available as 75% wettable powder, 2-lb. emulsifiable, and dust formulations. Call or write today.



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N.C. Rejects MH-30

The use of maleic hydrazide on tobacco plants for controlling sucker growth has been rejected by the North Carolina Agricultural Experiment Station. Dr. Kenneth R. Keller, in charge of tobacco research at N.C. State College, made known the experiment station's position at a special MH-30 conference in Raleigh, March 16.

Dr. H. Douglas Tate, manager of agricultural chemical research and development for the Naugatuck Chemical Division, United States Rubber Co., said that the move is not a final decision on the chemical. He said that N.C. State currently is engaged in long-term tests on MH-30 and, until these tests are completed, cannot give official recommendation on this chemical. Dr. Tate said that MH-30 will "continue to be a helpful chemical to the tobacco grower."

To Install Conveyor

United States Borax & Chemical Corp., Los Angeles, will install a 1300-foot mechanized conveyor system to transport borate ores from the bottom of its huge open-pit mine at Boron, Calif., to its surface plants. Trucks currently haul the ore from the bottom of the pit to a surface ore crusher,

traveling a distance of 2½ miles. The pit measures 2,000 feet long, 1,700 feet wide, and 275 feet deep.

The project, a continuous-belt operation, rising 315 feet to the surface, is scheduled for completion by next fall.

Royster Is Board Chairman

F. S. Royster Jr., son of the founder of F. S. Royster Guano Co., Norfolk, Va., has been elected chairman of the board of directors. He succeeds C. F. Burroughs Sr., who died Feb. 24. Charles F. Burroughs Jr. remains as president of the firm.

Mr. Royster, who had been a vice president and director of the company, has been with the firm since 1914.

Market Radox T For Corn

Monsanto Chemical Co., St. Louis, Mo., is marketing Radox T herbicide for the control of both broadleaf and grassy annual weeds in corn fields. The compound is a pre-emergence herbicide and is available as granules or liquid concentrate.

Radox T has been granted label registration by the U. S. Department of Agriculture on a no residue basis for use in corn.

Douglas Issues Dissent

Associate Justice William O. Douglas of the U.S. Supreme Court has issued a dissenting opinion to the court's rejection of an appeal by Long Island residents to review the Circuit Court's ruling which denied an injunction against DDT spray programs. Mr. Douglas said that the issues involved in the case are of such great public importance that they should be looked into.

He cited a number of references which placed the blame for injuries to wildlife on chemical sprays and said that, just because the spray program that affected the Long Island residents had ended, there was no reason for declaring the question moot. The need for adequate findings on the effect of DDT is of vital concern, Mr. Douglas said, not only to wildlife conservationists and owners of domestic animals but to all who drink milk or eat food from sprayed gardens. Mr. Douglas is noted for his many outdoor activities and his achievements as a naturalist.

Fernandez Heads Sales

Dr. Louis Fernandez, director of nitrogen products for Monsanto Chemical Co.'s Inorganic Chemicals Division, has been appointed director of sales and marketing administration for the division's marketing department, a newly-created position.

'60 Recommendations Issued

The 1960 revision of the handbook on insecticide recommendations has been issued by the U.S. Department of Agriculture. "Insecticide Recommendations of the Entomology Research Division for the Control of Insects Attacking Crops and Livestock," Agriculture Handbook No. 120, records suggested uses of chemicals for the protection of crops and livestock for the 1960 growing season.

Single copies of the handbook may be obtained for 65 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

100 Planes To Spray Budworm in New Brunswick

AN aerial spraying program to control the spruce budworm will cover some 2.5 million acres in New Brunswick, Canada, this year and is expected to cost \$2 million and involve 100 aircraft. Spraying operations will be conducted from five points—Fredericton, Keswick, Juniper, Boiestown, and the Blackville section of New Brunswick.

Airfields at Fredericton, Juniper, and Blackville are long enough to accommodate Grumman Avenger aircraft which have a spray load capacity of 750 gallons. The remaining fields are suitable for Stearman-type aircraft.

Forest Protection Ltd., a crown corporation composed of repre-

sentatives of pulp and paper companies and the provincial government, will carry out the operations. The private companies will meet one-third of the cost and the province will pay the balance.

On part of the Miramichi watershed, the DDT insecticide will be applied in a strength only half of that previously used. This is intended to minimize injury to the salmon population.

Budworm spray operations were carried out in Northern New Brunswick from 1952 to 1958, but not last year. During the seven-year period, a total of 14,027,000 acres were sprayed at a cost of \$11,670,000, or an average of 84 cents per acre.

A. E. Poulsen Dies

Alfred E. Poulsen, founder and president of the Poulsen Co., Los Angeles, died March 4 at his home in Los Angeles, following a brief illness. He is survived by his wife, Sonia, a son, William, and two daughters, Jill and Karen.

The company has announced the appointment of Russell G. DeMaat as general manager. He had been executive assistant in charge of manufacturing for Marquardt Corp., Van Nuys, Calif.

Herbicides Lose Potency

Diuron and Monuron lose effectiveness after prolonged exposure to ultraviolet light, found in sunlight, according to Lyle W. Weldon and F. Leonard Timmons of USDA's agricultural research service.

Their studies may explain, in part, why herbicides sometimes fail to be effective in arid areas where chemical decomposition of both weed killers may take place before they are carried into the soil by rainfall or irrigation. In laboratory tests conducted in cooperation with the Wyoming Agricultural Experiment Station, a 75 per cent reduction in the effectiveness of each chemical was recorded after it had been exposed to ultraviolet light for 28 hours.

Resistant Plants Needed

Much more attention needs to be given to the development of plants with built-in insect resistance, Dr. Marion W. Parker, director of the Crops Research Division of USDA's Agricultural Research Service, told a plant science seminar conducted by Campbell Soup Co.'s research and development department, April 6, at Camden, N.J.

Dr. Parker said that the development of vegetable varieties with insect resistance has not been given the attention that some of our field crops have received, perhaps due to the effectiveness and economic feasibility of employing modern pesticides to do the job. He warned, however, in view of the

rise of resistant insects, that much more attention needs to be given the development of built-in insect resistance.

Snell Acquires Sperling

Foster D. Snell, Inc., New York, has acquired Sperling Laboratories of Arlington, Va. Sperling conducts acute and chronic toxicity studies, and prepares petitions to FDA for clearance of drugs and food-additive chemicals.

The acquisition is Snell's third in as many years. Seil, Putt, & Rusby, New York, was acquired in 1957 and Davis & Bennett Laboratories, Dorchester, Mass., was taken over by Snell in early 1958.

Tedion Use Approved On Eleven Deciduous Fruits

TOLERANCES have been established for "Tedion" miticide, a product of Niagara Chemical Division of Food Machinery & Chemical Corp., Middleport, N. Y., and its use approved on eleven deciduous fruits. The tolerance set by the Food and Drug Administration is 5 ppm for apples, crab apples, pears, quinces, plums, prunes, grapes, apricots, cherries, peaches and nectarines. Previously a tolerance of 2 ppm on citrus had been approved.

With the new approvals, Tedion can now be used on these crops for mite control throughout the season. Previously applications could be made only up to petal fall, which, in general, limited the product to use in control of the European red mite. Now, with issuance of the tolerance, treatments can be extended to the period after fruit has appeared, thus allowing control of the complete complex of summer mites.

Among the advantages claimed for Tedion are that it is exceptionally safe from a toxicity standpoint, it is almost completely non-phytotoxic, and it offers lengthy residual effectiveness.

Niagara recommends that one pound of Tedion 25% wettable powder be used per 100 gallons of water for control of European red

Dow To Expand Division

Dow Chemical Co., Midland, Mich., is planning a \$30 million expansion program at its Louisiana Division, Plaquemine, La. Included in the plans is a new ammonia plant that will make both anhydrous and aqueous ammonia.

N. D. Fertilizer Use Rising

The North Dakota State Laboratories Department has released fertilizer tonnage figures which indicate that state farmers have been using consistently more fertilizer every year since 1950. The 1950 total was 20,202 tons while 1959 totaled 141,863.

mite on all deciduous fruits (except grapes). These applications should be made when the majority of the over wintering eggs have hatched. A second spray should then be applied when two-spotted spider mites or other summer mites put in an appearance. For grapes, the manufacturer recommends 4 pounds of the chemical per acre in sufficient water to cover plants thoroughly just before bloom — and a second application if and when needed.

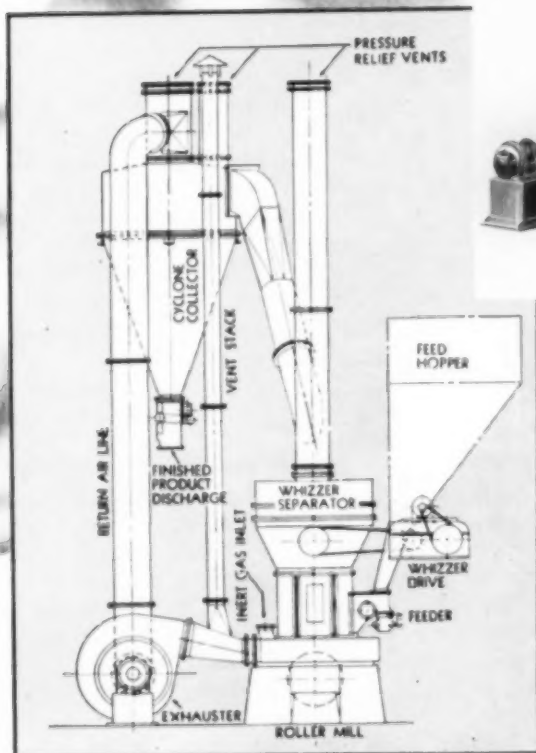
Under tolerances set by the F.D.A. it is possible to make three applications of Tedion to the pome fruits if this is preferred. In such cases, one-half pound of the material is used at the pink stage and at first cover. A final application of one pound is then made when later infestations show up.

Tedion is said to be exceptionally effective against eggs and the younger forms of mites, — less so against mature mites. It is specifically effective against mites, but has little effect against insects; thus it does not destroy predators which remain to control any surviving mites. The action is "protective" rather than "eradicated". Chemically, Tedion is tetra chloro diphenyl sulfone. It will be manufactured in a new plant now being constructed at Baltimore, Md.

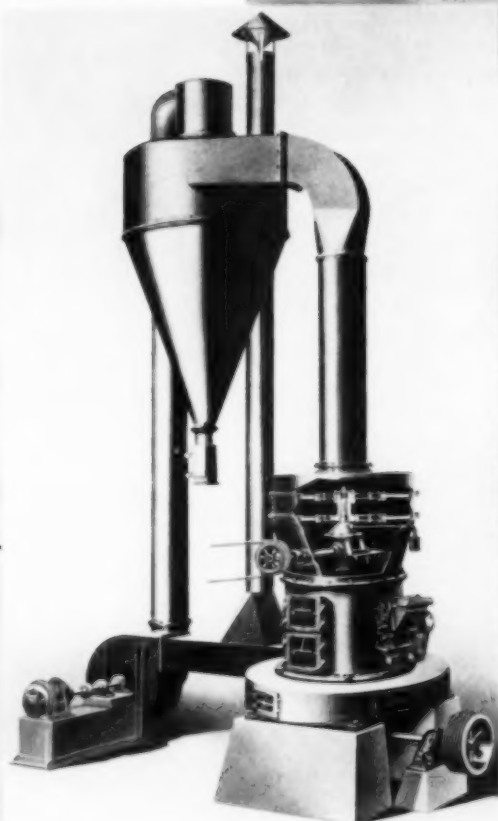
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with the **RAYMOND**
Whizzer-Equipped **ROLLER MILL**

CLEAN, SAFE
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Write for new insecticide Bulletin No. 84 which describes the application of Raymond Roller Mills and Imp Mills in pulverizing all of the modern formulations.



Production of powdered sulphur is a critical grinding operation. The modern Raymond Roller Mill is recognized as the outstanding unit in this field since it has special features built into it, which provide a safe, economical, trouble-free method for handling this sensitive material.

Mill system is continuously blanketed with inert gas that will not support combustion.

Piping and collectors of heavy gauge sheet steel with relief vents on mill and collector.

Special valves for discharging material from cyclone collector with minimum air leakage.

The Whizzer Air Separator operates perfectly in this safety system, and produces a superfine and uniform finished material at high capacity and low cost.

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SALES OFFICES IN
PRINCIPAL CITIES

Nelson Gets Sales Post

Richard L. Nelson has been appointed a sales representative for Allied Chemical Corp.'s Nitrogen Division. He will supervise the northern Illinois sales territory.

U.S. Products On Display

Products of six manufacturers of agricultural chemicals and fertilizers now are on exhibit at the first U.S. exhibition in an international horticultural exposition abroad. The U.S. Exhibit at the Dutch Floriade, 125-acre world's fair of gardening in Rotterdam, opened March 25 and will run through the summer, ending Sept. 25.

Displays of garden and lawn care chemicals are highlighted in a typical American garden shopping center inside the U.S. pavilion. Among the exhibitors are: E. I. du Pont de Nemours & Co., Wilmington, Del.; California Spray-Chemical Corp., Richmond, Calif.; Union Carbide Chemicals Corp., New York; Boyle-Midway, New York; Ra-Pid-Gro Corp., Dansville, N.Y.; and the Stadler Fertilizer Co., Cleveland.

Manager of Devon Plant

A. J. Civitello has been named manager of the Continental Can Co., flexible packaging plant in Devon, Pa. He had been production engineer of the Flexible Packaging Division.

To Build In Alberta

Naugatuck Chemicals Division, Dominion Rubber Co., plans to construct a plant in Western Canada to produce 2,4-D and MCP. Option has been obtained on a 52-acre site near Edmonton.

China's Output Inadequate

China's output of fertilizers, despite broad increases since the Communist government came to power, still represents only ten per cent of the estimated requirements of mainland agriculture. Although production has increased from 800,000 tons in 1957 to more than 1.2 million tons in 1958, con-

sumption rose from 1.8 million tons to 2.7 million tons, according to figures released by the Business & Defense Service Administration last month. Minimum annual requirements have been estimated at more than 10 million tons by China's own agriculture department.

Two Retire At AAC

Roy Simm, manager of the American Agricultural Chemical Co.'s engineering division, retired after 45 years service with the company, and R. M. Rodger, assistant to the general superintendent of fertilizer production in New York, retired after 42 years service.

Regional Groups Expand Services To Boost Sales

by H. H. Slawson

INCREASED sales and more efficient use of fertilizer are foreseen as results of steps taken recently by two large regional farmer supply cooperatives in widely separated midwestern areas.

Consumers Cooperative Association, Kansas City, Mo., established, early this spring, four new fertilizer service centers, while in St. Paul, Minn., Farmers Union Central Exchange opened its twelfth soil service center.

CCA's new fertilizer distribution facilities are located at Mead, Colo., Ida Grove, Ia., Clinton, Mo., and Grand Island, Nebr. Cleve McCarthy, manager of this co-op's mixed fertilizer department, is in general charge of operations at all four centers.

Central Exchange's addition to its chain of distribution outlets is at Sparta, Wis. Lloyd Feltes is local manager.

At each of the new centers mixing facilities are available for blending of fertilizer components on "prescription" orders that are based on actual soil samples.

C. K. Harmison, director of Central Exchange's feed and fertilizer division, described operations of this St. Paul-based service as "a personalized plant food program offered to every farmer individually." It sells the benefits of sound fertility as much as the fertilizer itself, he said, a principle now being vigorously observed by cooperative sales departments generally.

After consulting with the farmers, a possible crop yield goal is established and a fertility map of

the farmer's fields is drawn. Samples of the soil are taken and tested and a prescribed fertilizer is mixed at the service center and is spread on the farmer's land by trucks owned and operated by local cooperatives. This personalized service does not end there, for, during the growing season, the crop tissue is tested and the crop yields are carefully analyzed.

Central Exchange's first service center was built in 1956. Following the opening of the Sparta plant, plans were announced for another, the thirteenth in the chain, very shortly.

Operation of the four new Consumer Cooperative Association's fertilizer service centers closely parallels that of the St. Paul co-op. At each center an agronomist-manager works with local cooperatives to assist farmers in taking soil samples. The materials are mixed to specifications and bulk spreading equipment, provided by the local co-op, applies the finished mix to the farmer's fields.

CCA's mixed fertilizer department manager, Cleve McCarthy, says CCA's four centers will enable farmers to have fertilizer put on their land at about the same cost per unit as they now pay for bagged fertilizer at the retail outlet. Bulk fertilizer will not be sold from the centers in conventional grades, all sales being of materials mixed to meet the individual farmer's requirements. Each center will, however, stock bagged materials for use as starter fertilizer or for sidedressing during cultivation.

He
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thinks
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The aphid became a threat to agriculture as it developed immunity to dust and spray materials normally used for its control.

Thiodan®, a new product of the Niagara Chemical Division of Food Machinery and Chemical Corporation, not only proves highly effective against the aphid, but also curbs a wide variety of other destructive insects.

Eventual resistance of pests to control measures is a serious economic problem. It can be met effectively only by research on a national scale—research carried out by FMC's Niagara Chemical Division.

Besides Niagara Chemical Division, the FMC Chemicals team includes Becco Chemical, Chemicals & Plastics, Chlor-Alkali and Mineral Products Divisions. Drawing on the resources of FMC's Research and Development Center in Princeton, New Jersey, and other extensive laboratory and plant facilities throughout the nation, FMC offers the diversification necessary to serve a broad base of customers in government, agriculture and industry.

For a full alphabetical listing of the many products available from FMC's Chemical Divisions, write today for the new 34-page brochure "FMC Chemicals".

PRODUCTS OF THE FMC CHEMICAL DIVISIONS: BECCO CHEMICAL DIVISION—hydrogen peroxide and peroxygen chemicals; CHEMICALS & PLASTICS DIVISION—DAPON® and OXIROM resins, plasticizers and organic chemicals; CHLOR-ALKALI DIVISION—alkalis, solvents, and chlorinated products; NIAGARA CHEMICAL DIVISION—agricultural chemicals and pesticides; MINERAL PRODUCTS DIVISION—phosphates, barium and magnesium chemicals. Our 34-page brochure describing hundreds of FMC chemical products available on request.



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ELEMENTARY

W. Cotton Production Conf.

The Western Cotton Production Conference was held March 1-2 at the Hacienda Motel, Bakersfield, Calif. Discussion included reports on pink bollworm control in Arizona, problems in cotton defoliation, and concluded with insect control recommendations for 1960. The meeting was sponsored by the National Cotton Council and the Southwest Five State Cotton Growers Association.

Crop Disaster Seen In Poland

Reports published in Warsaw last month indicate that Poland might suffer a major crop disaster this year due to drought conditions which have persisted since last fall. Also blamed was the chemical industry for its failure to provide fertilizers of sufficient quantity and quality.

Deputy Minister of Agriculture S. Gucwa said that "even the oldest farmers do not remember such an unfavorable combination of weather conditions as we have at present." In a study on the shortage of fertilizers and insecticides, *Trybuna Ludu*, the official party newspaper, accused the chemical industry of having failed to take the necessary precautions.

Reorganize Western Office

International Paper Co., New York, has reorganized sales responsibilities in its western sales office. David H. Kennedy, who had been western regional sales manager, has been transferred to the company's executive offices in New York and the sales responsibilities for the western region have been broken down into three major branches.

J. D. Dooley is regional sales manager in charge of container board; N. P. Sparkman is regional sales manager in charge of Southern kraft paper and grocery bags; and R. H. Hinman handles fine paper and bleached board.

To Make Ammonium Sulfate

The Kearny, N.J. plant of Koppers Co.'s gas & coke division started production last month of

ammonium sulfate. The annual output is expected to be about 10,000 tons. The plant had been producing mono-ammonium phosphate.

Koppers ammonium sulfate will be marketed for use in fertilizers by Nitrogen Products, Inc., New Brunswick, N.J.

FMA Report Discusses U. K. Fertilizer Trends

INFORMATION on various aspects of the use of fertilizers in England has been made available by the Fertilizer Manufacturers' Association Ltd., London, in a new publication, *Fertilizer Report and Statistics 1959*. Changes in fertilizer concentration and demand for different nutrient ratios are detailed in the report.

Consumption of nitrogen is shown to have increased by 31.2 per cent between 1952-55 and 1958-59. Phosphate use went up by 9.5 per cent and the use of potash by 41.8 per cent in the same period. The popularity of compounds is reflected by the increase in their use from 64.7 per cent of total plant nutrients in 1952-55 to 72 per cent in 1958-59. It is also noted that the N:P₂O₅:K₂O ratio of the nutrients in compounds has changed appreciably from the 1:1.6:0.6 in 1945-46 to 1:1.3:1.6 in 1957-58, as consumption and concentration of nitrogen and potash have increased at faster rates than phosphate.

The swing from straight fertilizers to compound forms is most clearly marked, the report indicates, in the case of water-soluble P₂O₅, 91 per cent of which was applied in compound form in 1958-59, compared with 82 per cent in 1952-55, and less than 33 per cent in 1945-46. Between 1952-55 and 1957-58, the tonnage of nitrogen in compounds rose by 37.3 per cent while the tonnage of straight nitrogen rose by 18.5 per cent.

Fertilizer use in England often is lower than in other countries and the report shows, in detail, where these differences occur. The U. K. ranks eighth in potash and nitrogen consumption per acre and

Novel Equipment Advertising

Highway Equipment Co., Cedar Rapids, Iowa, is conducting an advertising campaign in consumer farm magazines that promotes custom spreading of fertilizers. The editorial-style advertisement is headlined "Contract Spreading Makes Sense."

ninth, equal with France, in phosphate. With the exception of Norway and Iceland, all countries consuming fertilizers at a higher rate than the U. K. have a smaller percentage of their total agricultural land under grass. In Belgium and Holland, rates per acre, particularly of nitrogen and potash, were higher on average than those in the U. K., not only on arable crops, but on grassland also. In countries in which fertilizers are used intensively, there has been a rapid increase in consumption of nitrogen and potash with phosphate rising at a slower rate, a trend which may further change the ratio of the nutrients in favor of nitrogen and potash in the U. K. in the future.

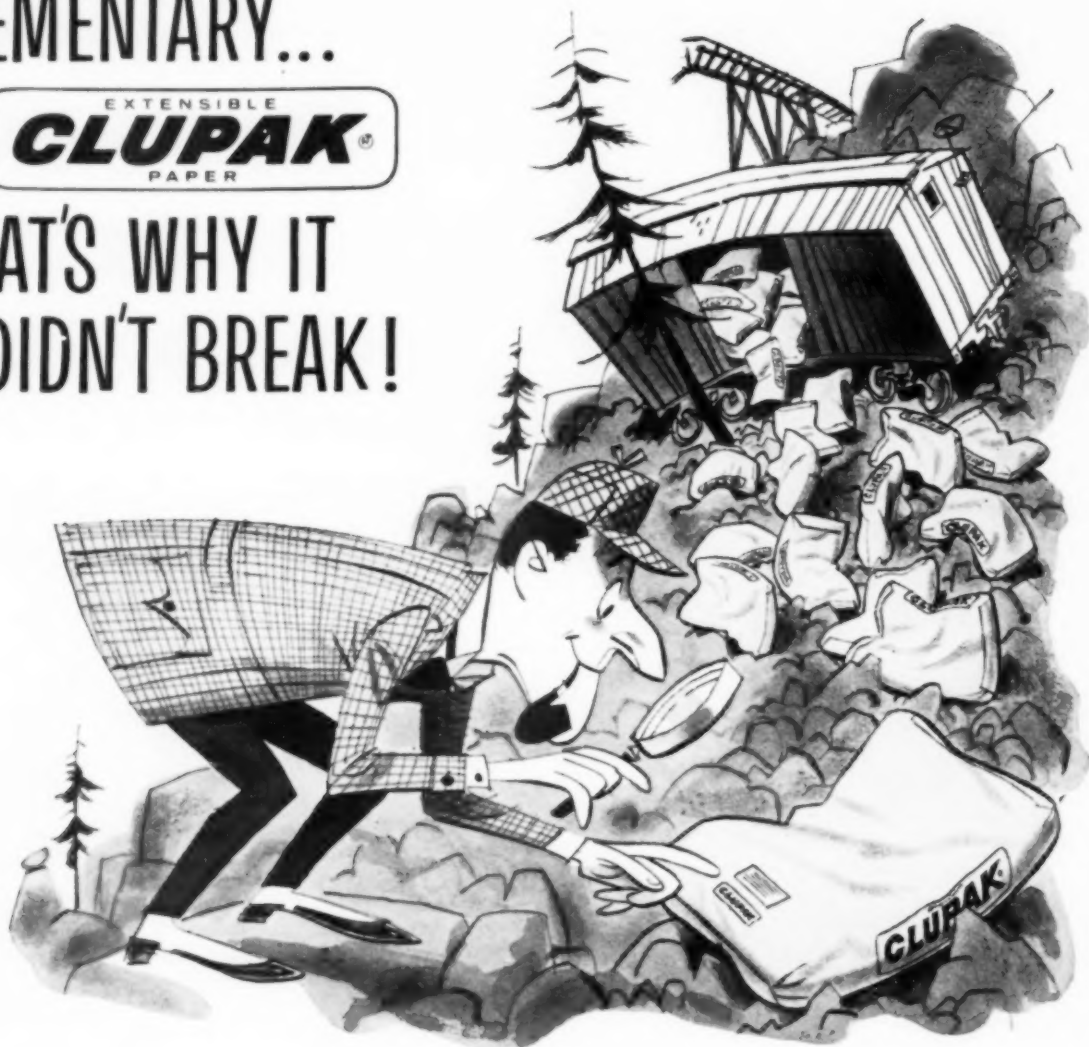
Estimates of fertilizer consumption in the fertilizer year 1958-59, compared with those in 1957-58, show that 63 per cent of total nitrogen was consumed in the form of compound fertilizers in 1958-59, compared with 59 per cent in 1957-58. Sulfate of ammonia deliveries for mixing represented 159.9 thousand tons N, or 49.8 per cent of total nitrogen consumption, compared with 146.4 thousand tons, or 46.4 per cent in 1957-58. A decline in consumption of single superphosphate was offset by an increase in demand for triple superphosphate and the tonnage of water-soluble P₂O₅ applied straight, fell from 11 per cent of the total in 1957-58 to 9 per cent in 1958-59.

Total potash consumption rose by 78 per cent in 1958-59 and the greater part of this increase was in the form of compound fertilizers. Potash sales were maintained at approximately 15 per cent of total K₂O consumption.

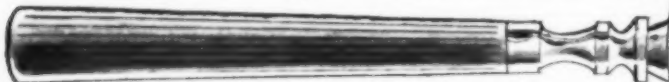
ELEMENTARY...

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• Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications. Clupak, Inc., 530 5th Ave., N.Y. 36, N.Y.



Elanco Names Swearingen

O. B. Swearingen has been appointed vice-president of agricultural products marketing by Elanco Products Co., a recently-formed division of Eli Lilly and Co., Indianapolis, Ind.

Mr. Swearingen joined Lilly in 1923 as a salesman in Chattanooga, Tenn. Prior to his most recent appointment, he had been director of sales in the Lilly agricultural and industrial products division.

Fred C. Shanaman Retires

Fred C. Shanaman retired April 27 as group vice-president, west for Pennsalt Chemicals Corp., Philadelphia. He had been with the company for thirty years and will continue to serve Pennsalt as a consultant.

Mr. Shanaman is succeeded by Hugh C. Land, formerly general manager of Pennsalt's industrial chemicals division.

Ferro To Expand Center

Ferro Corp., Cleveland, Ohio, is planning a \$255,000 expansion to its research center facilities. The expansion will provide an additional 9,600 square feet of office and laboratory space.

New Spencer Director

Ralph L. Gray, chairman of the Armco Steel Corp., has been elected a director of Spencer Chemical Co., Kansas City, Mo., to fill the vacancy created by the death of Kenneth A. Spencer, chairman of the board and founder of the company, who died Feb. 19.

The board of directors also named company president John C. Denton as chief executive officer. C. Y. Thomas, formerly vice-chairman of the Spencer board, was elected chairman.

Two Named By Agrico

J. D. DeHaan has been assigned to the headquarters staff at the New York office of the American Agricultural Chemical Co. to assist in sales promotion and training. He has been with Agrico since

1954 as regional agronomist at Fulton, Ill.

In a concurrent move, the company appointed Norman F. Spencer to replace Mr. DeHaan at Fulton.

Heads Hayes-Sammons Sales

A. N. White has been named general sales manager of all division of the Hayes-Sammons Chemical Co., Mission, Texas. He had been general manager of the company's Dixie Division at Indianola, Miss. Mr. White is replaced at Indianola by Harold W. Dube of the Hayes-Sammons sales department.

Mr. White joined Hayes-Sammons in 1953 as a sales representative and, in 1956, he was chosen to oversee construction of the company's Indianola plant.

Niagara Appoints Five

Five appointments in its Research and Development Department have been made by the Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N.Y. Those named were: Dr. Milton H. Fisher, who joined the company as senior organic chemist; Dr. Fred C. Swift, who has returned to Niagara to work in the field development program after leaving the company in 1955 to pursue graduate studies; and Dr. E. S. Hagood, who also has been appointed to work in the field development program.

Also named were Dr. Gene Maitlen, who assumes responsibility for the Jackson, Miss., branch laboratory of the research and development department, and Dr. Titus M. Johnston, who joined Niagara as a research pathologist.

Nopco European Producer

Nopco Chemical Co.'s wholly-owned subsidiary, Nopco Chemie, SA, Fribourg, Switzerland, has acquired a half interest in a French chemical firm, Doittau-Sopura, Corbeil-Essonnes, outside Paris.

Doittau-Sopura will produce the complete line of Nopco chemicals for distribution in the European Common Market area.

District Sales Manager

West Virginia Pulp and Paper Co., New York, has named Kenneth W. Glazebrook as New York district sales manager for multi-wall products. He succeeds James A. Mundie, who now is staff assistant to Sheldon Y. Carnes, northern region manager.

The New York district sales office serves industrial and consumer accounts in New York, New England, Pennsylvania, and Delaware.

Jersey Losing Eagles

The plight of the bald eagle in New Jersey appears to be steadily worsening, according to the New Jersey Audubon Society which said that out of the state's ten remaining active nests last year, five have not produced young this year.

The eagles, a national symbol, once were relatively common in the state. Frank W. McLaughlin, executive director of the New Jersey Audubon Society, said that the possible effects of insecticides on eagles were being watched. He pointed out, however, that "while this may be a factor, it looks as though disturbances by man is the big problem."

Oregon Bars Two Pesticides

Two insecticides, Aldrin and Heptachlor, commonly used for red clover root borer control, have been taken off the recommended list in Oregon. This decision is the result of possible residue problems in clover foliage.

Robert Every, Oregon State College entomologist, said that pending the results of residue studies, neither Aldrin nor Heptachlor, which have zero tolerance, will be suggested this year.

Quern Fills New Post

Food Machinery and Chemical Corp., New York, has named D. Stewart Quern to the newly-created post of senior sales coordinator for industrial chemicals in the southeastern territory for FM C's chemical divisions.

CHEMICALS FOR FORMULATORS

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CHLORDANE 40-W
CAPTAN 50-W
DDD (TDE)
DDT 50-DB
DDT 50-W
DDT 75-W
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DIELDRIN 50-DB
DIELDRIN 50-W
ENDRIN 50-DB
ENDRIN 50-W
HEPTACHLOR 25-DB
HEPTACHLOR 25-W
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All of the above materials may not be available from Stauffer in every region. For information, write or phone the Stauffer regional office nearest you.

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If you are formulating agricultural chemicals, it will pay you to check your requirements with Stauffer.

One reason is that Stauffer is in a position to supply many basic materials, technicals or concentrates.

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To Build In India

Simon-Carves Ltd., Cheshire, England, has received from East India Distilleries & Sugar Factories Ltd. a contract to build a complete new factory to make approximately 51,000 tons per year of compound fertilizers based on ammonium phosphate. The total cost is expected to be in the region of three million pounds. In addition to the compound fertilizer plant, the factory will include plants for production of synthetic ammonia, sulphuric acid and phosphoric acid, together with equipment for handling incoming raw materials and outgoing finished products. The factory is to be built at Ennore near Madras and is to come into production in two years.

Monsanto Sales Shift

The Organic Chemicals Division of Monsanto Chemical Co., St. Louis, Mo., has abolished its three positions of regional sales manager and all district sales offices now report to one of two directors of sales operations.

Tully C. Tupper is director of sales operations for the district sales offices in Detroit, Cleveland, Cincinnati, Chicago, Minneapolis, St. Louis, Houston, Los Angeles, San Francisco, and Seattle.

Ernest S. Robson, former eastern regional sales manager, now supervises sales operations in New York, Everett, Mass., Syracuse, N. Y., Pittsburgh, Wilmington, and Atlanta.

The former western regional sales manager, Edward Schuler, now is in charge of the San Francisco district sales office and the division's west coast agricultural chemicals sales.

OK MH-30 In Potatoes

The Food and Drug Administration has granted a residue tolerance for maleic hydrazide in raw potatoes, potato chips, and onions. The chemical, a product of Naugatuck Chemical division, U. S. Rubber Co., New York, can be used to stop sprouting in stored pota-

atoes and onions. It is applied to potatoes and onions in a water spray before harvest.

J. Raymond Myers Dies

J. Raymond Myers, manager of the fertilizer production department of Eastern States Farmers' Exchange, West Springfield, Mass., died March 6 of a cerebral hemorrhage at his home in York, Pa. He was 55 years of age.

Mr. Myers joined Eastern States in 1935 as the first manager at its Chambersburg, Pa., service center. He had been at the York plant since 1950.

Pyrethrum Inquiry Ends

The commission of inquiry in the dispute between Mitchell Cotts Ltd. and the Pyrethrum Board of Kenya ended Feb. 23 because of an explosion Feb. 19 at the East African Extract Corporation's pyrethrum extract plant in Nairobi. The plant was partially destroyed and 19 people were injured.

A. Mackie Robertson, counsel for Mitchell Cotts, said that there would be no useful purpose served in the continuance of the inquiry. Mitchell Cotts had sought amendments to the Pyrethrum Ordinance of 1956.

Fertilizer Plant In Malaya

A plant for the production of fertilizers is to be erected in Malaya by the Standard Vacuum Oil concern, in cooperation with the Wah Chang Corp., New York.

Groups Study Merger

A committee has been appointed by the Rust Prevention Association, Minneapolis, Minn., and the Northwest Crop Improvement Association to study a proposed merger of the two organizations.

Cornell Molybdenum Tests

A recently-completed series of greenhouse experiments conducted by Cornell University's department of agronomy indicates that birdsfoot trefoil and ladino clover are benefitted by soil treatments with molybdenum compounds. Alfalfa also was benefitted, to a limited degree, by the soil treatments.

The experiments were run on several samples of Mardin silt loam soil and showed that small additions of molybdenum ($\frac{1}{2}$ pound sodium molybdate per acre) make it possible to obtain good yields of birdsfoot trefoil at lower levels of liming than if molybdenum is not applied.

Chloro Compounds Offered

New chloro compounds with reactivity characteristics similar to benzyl chloride are being offered free in research quantities of one pound or more by International Minerals & Chemical Corp., Skokie, Ill.

The compounds — monochloromethyl alkylbenzenes, bis (chloromethyl) alkylbenzenes, chloromethyl methylnaphthalenes, and polychloro methylnaphthalenes — are said to be particularly attractive intermediates.

Utah Fertilizer Industry Conference Speakers

Paul Christensen (left) soils extension specialist, Utah State University, talks with speakers at the Utah Fertilizer Industry Conference held recently at Ogden and Provo, Utah. To the right of Mr. Christensen are (left to right): Elroy Nelson, First Security Bank; Melvin Burningham, county extension agent; Rex Nielson, soils specialist; and Dean Farnsworth, Phillips Petroleum Co. Other



speakers at the meeting included Elmer Christensen, Utah State chemist, and F. Todd Tremblay, N.P.F.I.

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Because of a major breakthrough in resin technology by Union Carbide, chemicals and other agricultural products may now be packaged in Kraft multiwall bags coated with **BAKELITE** high-density polyethylene.

In addition to providing equal or better moisture resistance than low-density coatings approximately *twice the thickness**, . . . laboratory tests at Union Carbide show that high-density coatings provide greater interior abrasion resistance and are *20 times* more effective than low-density coatings of the same thickness as a barrier to greases and high penetrating oils. And, multiwall bags coated with high-density polyethylene can be used on standard bagging and closure equipment.

For further information, see your packaging supplier, or write:
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In Canada: Union Carbide Canada Limited, Toronto 7.



* Determined in a 300-hour moisture pickup test conducted by International Paper Company on 50-lb. Kraft bags, polyethylene coated, and filled with calcium chloride.

BAKELITE and UNION CARBIDE are registered trademarks of Union Carbide Corporation.

Canadian Warfarin Plant

Arrangements have been completed for the manufacture of Warfarin in Canada, according to the Wisconsin Alumni Research Foundation, holders of the Warfarin patents. Canadian manufacturing facilities are located in Vancouver, B.C.

Plan Colombian Plant

A private Colombian development bank has joined forces with American and West German interests in plans to build a \$12 million chemical fertilizer plant in the Caribbean port of Cartagena. Colombia spends an estimated \$15 million per year to import fertilizers from the U. S. and West Germany.

A new company, known as Cia Organizadora de Industrias de Abonos y Productos Quimicos Ltda., has been formed to develop the plant program. Equal interests are held by International Petroleum (Colombia) Co., Ltd., International Development & Investment Co., Ltd. (IDI), and Corp., Financiera Colombiana, The Colombian development bank. IDI is owned jointly by Phoenix-Rheinrohr, West German steel company, and the Chemical and Industrial Corp. of Cincinnati.

Named Division Manager

Clayton M. Porter has been appointed division manager for Highway Equipment Co., Cedar Rapids, Iowa. He will cover the states of Indiana, Ohio, Kentucky, Michigan, West Virginia, Virginia, western Pennsylvania, and Garrett and Allegheny counties in Maryland.

To Market Malathion

American Cyanamid Co., New York, has announced plans to market Malathion under its own label for use as a protectant on stored grain. The product is a 57 per cent emulsifiable liquid made from premium grade technical and contains five pounds of Malathion per gallon.

Ten Eyck Honored at Tokyo Farewell Party



P. T. Gifford Nash, managing director of Fisons Ltd., South Africa, gave a farewell luncheon recently at the Imperial Hotel in Tokyo, Japan, in honor of H. S. Ten Eyck, president of International Ore and Fertilizer Corp., New York. Photo shows (left to right): M. Aihara, Lux Ore & Chemical; T. Onoda,

Lux Ore and Chemical; T. Dazai, Nitto Chemical Industry Co.; B. D. Cooper, regional director, International Ore; J. Martine, Interore South Africa; M. Anzai, Showa Denko; Mr. Ten Eyck; Mr. Nash; Y. Taniguchi, Sumitomo Chemical Industry Co.; and T. Yamakoshi, Nissan Chemical Industries Ltd.

Ammonia Supplies Improved

Ammonia supplies and storage facilities in the major farming areas of the United States seem to have improved considerably over a year ago, according to Jack F. Criswell, executive vice-president of the Agricultural Ammonia Institute. He said that this is important because late cold weather has held back field work in many areas and demand for ammonia will "come with a rush when it starts."

International Locust Drive

Thirteen countries have signed an agreement at the headquarters of the United Nations Food and Agriculture Organization in Rome to start a six-year project for locust control at a cost of more than \$3,800,000.

Starting this month, locust swarms are being sprayed from the ground and the air in a large belt stretching from Morocco on the Atlantic Ocean to the Himalayas. The aircraft are being provided by the participating governments. Intensive ground operations in areas where locust swarms form, breed, and feed are being closely integrated with the aerial spraying.

Named Product Supervisor

Richard G. Tousey has been appointed product supervisor for American Cyanamid Co.'s herbicide products. He had been pro-

motion manager for Cyanamid's phosphates and nitrogen department.

Strobane Cotton Pesticides

Stauffer Chemical Co., New York, now is marketing several cotton insecticides based on Strobane. The Stauffer products are: Strobane 6 lb. per gallon emulsifiable concentrate; Strobane 20 dust; Strobane-DDT 4, 2 lb. per gallon emulsifiable concentrate; and Strobane - Sulfur 20 - 40 Dust.

Technical Strobane, produced by Heyden Newport Chemical Corp., has been field tested for several years in the cotton belt and is reported to be highly effective.

Heads Combined Districts

Kenneth Kardux has been named manager of the Richardson Scale Co.'s New York district. The district was formed recently by Richardson's combining of its upper New York and Buffalo districts. Mr. Kardux is headquartered at Camillus, N. Y.

Barker Named By Witco

Graham Barker has been named assistant product sales manager for Emcol products by Witco Chemical Co., New York. He will assist Arthur O. Raven, Emcol product sales manager.



THE LINE RIDER AND HIS GANG of Diamond Chemical killers are the most inexpensive hirelings you can find for rubbing out weeds and brush. Back in Ohio they saved their bosses \$18.75 per highway mile per season.

Meet the gang:

FOR MIXED BRUSH—LINE RIDER LV-3D/3T, a 2-Ethyl Hexyl Ester formulation of 2,4-D and 2,4,5-T containing 3 pounds each of acid equivalent per gallon.

FOR MAPLES AND OAKS—LINE RIDER LV-6T, a 2-Ethyl Hexyl Ester formulation of 2,4,5-T containing 6 pounds of acid equivalent per gallon.

FOR AREAS ADJACENT TO SENSITIVE CROPS—LINE RIDER AMINE 22, alkyl amine salt formulation of 2,4-D and 2,4,5-T containing 2 pounds each of acid equivalent per gallon. Applied as a water-borne spray.

FOR SPECIAL CONDITIONS—Also available are other standard LINE RIDER formulations, including Butyl and Low Volatile Esters of 2,4-D and 2,4,5-T containing 4 pounds acid equivalent per gallon.

If you want deadly marksmanship, send for new LINE RIDER brochure giving details. Write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

 **Diamond Chemicals**

Collier Appoints McGough

Collier Carbon and Chemical Corp., Los Angeles, has appointed R. H. McGough as general manager of agricultural sales. Formerly manager of the Collier chemical sales development department, Mr. McGough has been associated with the chemical and agricultural field for 23 years. William R. Van Lierie continues as manager of domestic agricultural sales.



Velsicol Names Three

Velsicol Chemical Corp., Chicago, has announced the appointments of Chris P. Gicas and Louis H. Mehalek to the company's Chlordane insecticide marketing staff, and Emil F. Bless as sales representative for the agricultural chemicals division.

Mr. Bless is responsible for sales and technical service in the states of Alabama and Georgia and northwest Florida.

Mr. Gicas will cover Florida, Georgia, Alabama, North Carolina, and South Carolina. Mr. Mehalek's territory is Ohio and Michigan.

Test Chemagro Pesticides

Chemagro Corp., Kansas City, Mo., has released three experimental agricultural insecticides for general field evaluation in the United States and Canada. Developed by Farbenfabriken Bayer, A.G., Leverkusen, Germany, these materials already have been tested in other parts of the world. The materials are identified by experimental code numbers Bayer 29493, Bayer 28589, and Bayer 30686.

Bayer 29493, also referred to as Baytex, has been successfully tested by the World Health Organization against lice, ticks, flies, mosquitoes, and bed bugs in malaria control campaigns. In other tests, the material has controlled many plant pests.

In agricultural areas where mites have indicated resistance to currently available compounds, Bayer 28589 and Bayer 30686 have

shown marked specificity for the control of mites. The materials (both non-phosphate compounds) have been tested on cotton, fruit, and ornamentals. They are expected to be available commercially within a year.

Isolate Natural Attractant

Increased effectiveness in controlling gypsy moths may result from the isolation and partial identification of a natural attractant found in female moths, according to Martin Jacobson, Agricultural Research Service, USDA, who spoke at the American Chemical Society meeting at Cleveland, Ohio, held April 5 to 14.

Mr. Jacobson said that he and his co-workers have collected and purified a single drop of the attractant from the bodies of more than half a million female gypsy moths. The chemical structure has been partially determined to be an ester alcohol, *hydroxyacetoxyhexadecene*. For many years a crude form of this attractant, obtained by crushing segments of female moths, has provided the only reliable method for determining the location and extent of gypsy moth infestations. If the complete analysis of the new substance shows that a synthetic attractant can be made cheaply, gypsy moth control programs will be greatly improved by the use of traps on a far larger scale than now is possible, Mr. Jacobson said.

The fate of heptachlor in the soil following granular applications to the surface was outlined in a paper prepared by W. F. Barthel, R. T. Murphy, and W. G. Mitchell Plant Pest Control Division, ARS, Gulfport, Miss. Mr. Barthel, who presented the report, said that a study was set up to determine the factors involved in the loss of heptachlor residue and possible means of controlling this loss. It was found, he said, that much of the loss can be accounted for by vaporization of the insecticide which can be prevented by the use of a number of additives.

Seeland Heads LeGear Co.

Frank Seeland has been elected president of Dr. LeGear, Inc., St. Louis, manufacturer of proprietary animal health products. The former president, Dr. Daniel H. LeGear, is retiring.



Mr. Seeland is continuing as vice-president in charge of the farm chemical & insecticide division of S. B. Penick & Co., New York, which last November acquired controlling interest in Dr. LeGear, Inc. Mr. Seeland has been with Penick since 1952 and was elected vice-president in 1955.

USDA Melon-Fly Lure

Q-Lure, a new melon-fly chemical attractant synthesized and tested by U.S. Department of Agriculture entomologists, is reported to be many times more effective than anisylacetone—heretofore the best available synthetic attractant for the melon fly.

The new lure attracts male flies of all ages and permits detection of infestations before the insects can mate and build up damaging populations. Tests of the lures have been carried out at the fruit fly laboratory of the Department's Agricultural Research Service in Honolulu, Hawaii. Research now is underway to determine whether the lure can be combined with suitable poisons, so that the melon fly can be eradicated by male annihilation.

Butonate Gets Test Permit

Butonate, a new organic phosphate insecticide developed by Dr. J. E. Casida and B. W. Arthur at the University of Wisconsin, Madison, has been granted an experimental permit for extended field tests. The chemical name of the compound is O,O-dimethyl 2,2,2-trichloro-1-n-butyryloxyethyl phosphonate.

Laboratory tests on the insecticide, carried out by the Wisconsin Alumni Research Foundation, have been generally confined to household insects but preliminary tests on additional insects indicate that Butonate may be a promising agricultural pesticide.

Fungicide Results Ready

The "Results of 1959 Fungicide and Nematocide Tests" now is available. Issued annually by the American Phytopathological Society advisory committee on collecting and disseminating new fungicide data, the report provides information on products available for testing, composition of products, and their sources.

Copies are available at \$1 each from A. B. Groves, Winchester Fruit Research Laboratory, Route 3, Winchester, Va.

Ethion Tolerance Granted

A tolerance of 1 ppm. for residues of Ethion on beans, melons, green onions, and strawberries has been established by the Food and Drug Administration and label claims for the insecticide have been approved. In addition, a similar tolerance approval allows its extended use on tomatoes.

The material, produced by the Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N. Y., already had been approved for use on a number of field, truck, and fruit crops.

A.A.C. Building In Florida

Construction was begun recently on a new phosphate washer at the Palmetto mining location of the American Agricultural Chemical Co., ten miles south of Pierce, Fla. The installation, which will include both washing and recovery equipment, is scheduled for completion in March, 1961.

Calder Heads Union Bag

Alexander Calder Jr., president of Union Bag-Camp Paper Corp., New York, has been elected to the additional post of chief executive officer, succeeding Alexander Calder.

Hugh D. Camp, formerly executive vice president, has been elected chairman, while James L. Camp Jr., has been named chairman of the executive committee. He had been vice chairman of the board.

NEWS BREVITIES

TOBIAS BRADLEY, midwest sales manager for Potash Company of America until his retirement in 1957, died April 17 in Peoria, Ill. He was 68 years old. Mr. Bradley joined Potash Co. in 1942.

AC

THOMAS O. EVRARD has been named technical serviceman for Diamond Alkali Co.'s Chlorinated Products Division. He formerly was with the United Fruit Co. in Cuba.

AC

COLLOIDAL PRODUCTS CORP., Sausalito, Cal., has named Leonard Lett as southern manager. For the past 13 years Mr. Lett had been an agronomist in the production and marketing division of the National Cotton Council.

AC

ST. REGIS PAPER CO., N. Y., has appointed C. C. Smith as district sales manager of the Cleveland sales area of its bag division. The area includes northern Ohio and western Pennsylvania.

AC

T. A. JONAS has been appointed manager of the Washington office of the national northern division, American Potash & Chemical Corp., Los Angeles. He replaces J. S. Murray.

AC

W. H. BRICKER has been named technical field representative for the central region by Chemagro Corp., Kansas City, Mo. Mr. Bricker makes his headquarters at the company's regional office in St. Louis.

AC

A. E. STALEY MANUFACTURING CO., Decatur, Ill., has appointed Byron L. Fast as manager of its process service section. He has been with the company 15 years.

AC

MARION C. MANDERSON has been appointed technical director, nitrogen-phosphate division of the Armour Agricultural Chemical Co., Atlanta, Ga. He had been

associated with the Arthur D. Little research firm in Cambridge, Mass.

AC

ROBERT D. WELDON has been named manager, turf and garden fertilizer sales for American Agricultural Chemical Co., New York.

AC

GEORGE L. OPPEL, formerly manager of agricultural manufacturing for the American Cyanamid Co., New York, has been appointed director of production for the United States Borax & Chemical Corp., Los Angeles.

AC

DR. DARRELL A. RUSSEL has been named agriculturist in the fertilizer distribution branch division of agricultural relations, TVA, Knoxville, Tenn. He had been assistant professor of soil chemistry at North Louisiana Hill Farm Experiment Station, Homer, La.

AC

HAROLD W. CALDWELL has joined Allied Chemical's Nitrogen Division as a sales trainee in the Indianapolis, Ind., district.

AC

ELDRIDGE J. BLACK has been named vice-president and general manager of Stepan Chemical Co.'s newly-formed industrial chemicals division. He is headquartered at Chicago.

AC

RICHARD GRUBER has been named New England district manager for the Richardson Scale Co., Clifton, N. J. His offices are in West Boylston, Mass.

AC

VALLEY FERTILIZER CO. has been incorporated in Phoenix, Arizona, to manufacture, distribute, and sell fertilizers.

AC

AVERY STUTS has resigned as general manager of the Idaho phosphate works of Central Farmers Fertilizer Co., Chicago. Paul Cairns, administrative vice president was named acting general manager.

Convenient Plant Food Packs

Packets of laminated aluminum foil and polyethylene, designed to contain convenient, one-dose measures of plant food for homes, are a new packaging-merchandising device being used by the American Agricultural Chemical Co., New York.

Flip-top-type boxes contain four packets of plant food, each of which contains just the right amount of water soluble Agrico plant food to make one quart of plant feeding solution. The packets are manufactured by the Flexible Packaging Division of Continental Can Co., New York, and the boxes are produced by Continental's Boxboard and Folding Carton Division.

Hooker Compounds Review

Hooker Chemical Corp., Niagara Falls, N.Y., has issued a 12-page technical bulletin that reviews four fluorinated chemical compounds now available on a commercial scale for the first time.

"Benzotrifluoride and Its Ortho-, Meta-, and Parachloro Isomers" is the title of the bulletin, No. 12-A, which presents physical and chemical properties of each material and its suggested applications. Derivatives for making fungicides and insecticides are obtained from the compounds.

Witco Emcol Brochure

A brochure listing Witco's complete line of Emcol surface active agents, classified both by use and by chemical type, has been prepared by Witco Chemical Co., New York.

Among the headings under which uses are classified are: agricultural emulsifiers, cosmetics, detergents, dry-cleaning detergents, and wetting and dispersing agents.

New Bin-Dicator Use

The Bin-Dicator Co., Detroit, is offering its Bantam Bin-Dicators for use in determining the level of liquid materials in bins, chutes, or conveyors. Originally developed

to provide level indication and control with dry, free flowing bulk materials, the indicator is a small, pressure sensitive switch.

Chemagro Protective Device



Chemagro Corp., Kansas City, Mo., has introduced a protective device that prevents scuff damage to its lithographed metal containers while in shipment or storage. Chemagro is using a polyethylene sleeve over its five gallon containers of Guthion and Del. The sleeve, on the right-hand container, prevents scuffing and need not be removed prior to display by the dealer. The old wrapper, a kraft paper sleeve, is shown on the left.

Jet-Mogenizer Bulletin

Buschman Products Inc., New York, has prepared a bulletin that describes the design, functional advantages, applications, and horsepower ratings for its new Jet-Mogenizer homogenizing units. Copies of the bulletin are available from the company at 114 East 40th Street, New York 16.

Disposable Protective Wear

Singer Glove Mfg. Co., Chicago, is offering disposable clothing made of a lamination of cloth and fiber that can be used to protect outer garments of personnel who handle chemicals.

Available as capes with sleeves, bib aprons, or as sleeves, the clothing is tear- and flame-resistant. A catalog sheet is available from the company at 860 W. Weed St., Chicago 22, Ill.

Equipment, Supplies, Bulletins

Ammonium Nitrate Facts

Phillips Petroleum Co., Bartlesville, Okla., has prepared a booklet about fertilizer grade ammonium nitrate in an attempt to clarify an erroneous impression on the part of some officials that the product is an explosive. The booklet, "Facts You Should Know About Fertilizer Grade Ammonium Nitrate," was prepared by Paul W. Tucker, R. S. Neff, and A. F. Dyer, all of Phillips Petroleum Co.

The booklet points out that ammonium nitrate cannot be used as an explosive, except when it is blended with the proper proportion of diesel fuel or other sensitizing ingredient, and primed with a detonator. In actuality, the booklet states, ammonium nitrate is only one of the components rather than the sole ingredient as is commonly inferred in the dramatic type of newspaper article where the technical details either are left out or ignored. In addition, when ammonium nitrate is compounded with fuel oil or other carbonaceous and organic substances, it is classified by the Interstate Commerce Commission as *nitro-carbo-nitrate* and should not be referred to or treated as ammonium nitrate fertilizer.

Recommendations for storing bagged ammonium nitrate also are included in one booklet and safety precautions are outlined.

Bulk Material Hauler

Highway Equipment Co., Cedar Rapids, Iowa, has added the Model "C" Bulk Material Hauler to its line of bulk fertilizer spreaders. The Model "C" can be used for transporting and unloading granular materials.

White Oil For Sucker Control

Sonneborn Chemical and Refining Corp., New York, has prepared a bulletin on the use of white mineral oil for controlling the growth of tobacco suckers. Recent tests described in the bulletin indicate that emulsions of white mineral oil can prevent sucker growth by coating and smothering the buds.

Formulae for the preparation of two emulsions, utilizing Sonne-

born's Kaydol and Protol white mineral oils, are contained in the bulletin. Write to Sonneborn at 300 Park Ave. South, New York 10.

Gates Tank Bulletins

The Gates Rubber Co., Denver, Colo., has prepared a descriptive folder on its rubber lined tanks for liquid fertilizer storage. In addition, the company is offering a special bulletin to describe its new 1,000 gallon nurse tank.

Y&T Adds Two Truck Models

Yale Materials Handling Division, the Yale & Towne Manufacturing Co., Philadelphia, has developed two 22,000 pound capacity lift truck models for addition to its G-5 cushion tire, gas-powered industrial truck line.

The new units are said to be the highest capacity equipment of their type available to industry.

New Spraying Systems Nozzle

Spraying Systems Co., Bellwood, Ill., has introduced a new diaphragm TeeJet spray nozzle in nylon for airplane spraying. Orifice units are available in choice of interchangeable hardened stainless steel discs and nylon cores. Complete information is available in Data Sheet 8355 from the company at 3230 Randolph St., Bellwood.

Incco Rodenticide Folder

Inland Chemical Co., New York, has prepared a folder on its anti-coagulant rodenticide concentrate Incco 86. The water soluble formulation can be used in combination with dry bait in rodent control, or as an independent rodent bait when rats and mice have sufficient dry foods available and tend to take more readily to water bait.

Samples of Incco 86 are available from the manufacturer at 415 Lexington Ave., New York 17.

Montmorillonite Booklet

Star Enterprises, Inc., Cassopolis, Mich., is offering a technical bulletin describing its montmorillonite fuller's earth. This montmorillonite is said to contain about 4 per cent less aluminum than do other montmorillonites. In addition, it does not swell appreciably when placed in water. The clay is mined at Olmsted, Ill.

Marine Pumps Bulletin

Marine Products Co., Detroit, Mich., is offering a bulletin describing its all-iron pumps for liquid fertilizer. Six types of pumps are described.

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HIGH GRADE COLLOIDAL KAOLINITIC KAOLIN

"TAKO" Gives top performance **ECONOMICALLY**—used in large tonnage year after year by the insecticide-pesticide industries.

"TAKO" Airfloated Colloidal Kaolinitic Kaolin is practically a chemically pure inert colloid with exceptional qualities and excels as a diluent-carrier in formulations of insecticides-pesticides. It gives increased workability—dispersion in formulations, its purity is highly desirable due to its compatibility with chemicals, its colloid properties give increased toxic action—greater adhesive-adsorptive properties.

"TAKO" This *Natural Very Pure Colloidal Kaolinitic Kaolin* is produced from our Company-owned mines, processed under straight-line production with the very latest electric controlled automatic equipment—resulting in our very low per ton established price for this quality *Colloidal* product. *"Costs So Little—Does So Much"*

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"TAKO" is produced under complete laboratory control. Large tonnage used by the insecticide-pesticide, fertilizer, chemical, & other large industries.

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INVESTIGATE **"TAKO"** FOR YOUR REQUIREMENTS

Waterless Nitrogen Solutions

Commercial Solvents Corp., New York, has announced a new line of water-free nitrogen solutions for use by fertilizer manufacturers in the preparation of mixed plant foods. The water content of the Dri-Sol line is one-half of one per cent.

The Dri-Sol solutions are available in grades ranging from 24 per cent ammonia and 76 per cent ammonium nitrate to equal parts of each.

Tractor Shovel Bulletin

A four-color bulletin describing six "Michigan" line tractor shovels has been published by the Construction Machinery Division of Clark Equipment Co., Benton Harbor, Mich.

Covering models 55A, 55B, 75A, 85A, 125A, and 175A, the bulletin is illustrated with working drawings and photographs.

PESTICIDE OUTLOOK

(From Page 42)

Exports of 2,4-D and 2,4,5-T together (acid basis) were 14 per cent less in 1959 than in 1958. At the same time exports of other herbicides (gross weight) were down 29 per cent. The value of 2,4-D and 2,4,5-T exports amounted to 40 per cent of the value of all herbicide exports in 1959. Canada is the leading destination for U. S. exports of weed killers. Stocks of 2,4-D and 2,4,5-T were lower at the end of the last growing season than at the same time in 1958 and domestic consumption apparently was much higher than ever in the history of these chemicals.

Maleic hydrazide, for the most part a growth inhibitor rather than a weed killer, has become a factor in saving certain labor costs. More important uses are as an inhibitor of sucker growth in flue cured and burley tobacco crops, and of grasses on utility sites and along roadways. It is used also in the control of wild onion and wild garlic in pastures, and of quackgrass in corn. Formerly it was applied to potatoes

and onions to inhibit sprouting in storage.

Fumigants

U. S. exports of fumigants in 1959 amounted to 3,678,000 pounds, valued at \$1,065,000. On a dollar basis, this was only 4.2 per cent lower than in 1958, the first year of record.

Refined naphthalene for household use in protecting stored woolens is in tight supply, reflecting the short supplies of crude naphthalene brought about by the steel strike of last year.

Materials intended to be added to stored grain to protect it from insect damage for a considerable period now include certain pyrethrum-piperonyl butoxide ("Pyrenone") mixtures, preparations containing a premium grade malathion, and aluminum phosphide tablets ("Phostoxin").

Dust Carriers and Diluents

In 1958 the consumption of dust carriers and diluents in pesticide preparations rose above the 1957 level but did not reach that in 1955 or 1956 (Table 5). Any appreciable shift from dusts to liquid sprays would tend to diminish the demand for solid diluent materials. On the other hand, use of granular preparations has expanded until it now probably comprises 20 to 25 per cent of all use of solid diluents in pesticides.★

SPRAY CONTROVERSY

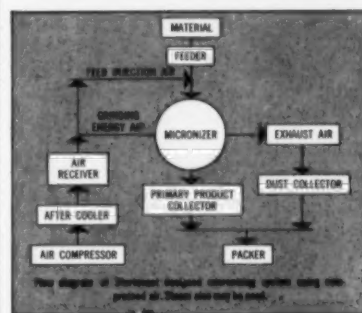
(From Page 57)

ple and wildlife than I do to eliminating all automobiles to solve the problem of traffic injuries and fatalities. I see nothing morally wrong or scientifically contradictory in preserving the beauty of a tree by spraying rather than letting the insects ruin its appearance.

Several weeks ago, I received a phone call from a very upset resident who claimed that the town had killed blue jays in her yard by spraying town trees. Since our spray rigs had not been in use for a month, this seemed difficult to

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Sturtevant Micronizers grind and classify in one operation in a single chamber—provide fines in range from 1/2 to 44 microns to meet today's increased product fineness needs. Can handle heat-sensitive materials.

Production Model
(15 in. chamber)

No Attritional Heat

Particles in high speed rotation, propelled by compressed air entering shallow chamber at angles to periphery, grind each other by violent impact. Design gives instant accessibility, easy cleaning. No moving parts.

Classifying is Simultaneous

Centrifugal force keeps oversize material in grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size.

Eight Models Available

Grinding chambers range from 2 in. diameter laboratory size (1/2 to 1 lb. per hr. capacity) to large 36 in. diameter production size (500 to 4000 lbs. per hr. capacity). For full description, request Bulletin No. 091.

Engineered for Special Needs

A 30 in. Sturtevant Micronizer is reducing titanium dioxide to under 1 micron at feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200-1400 lbs. per hr. A pharmaceutical house uses an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns.

Sturtevant will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. Write today.

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believe. Upon investigation, it was discovered that there were no elm trees in the area, so no spraying had been conducted. Further investigation revealed that the birds had been electrocuted by high tension wires. The damage already had been done, however, because this neighbor had contacted home owners in the vicinity and protested any future spraying, claiming it had resulted in birds being killed.

Aerial spraying for the control of the codling moth and other destructive insects has come in for its share of criticism and controversy as well. It is interesting to note, in this regard, that the Commonwealth of Massachusetts, Department of Natural Resources, has been continuously engaged in an aerial spraying program that began in 1948. Massachusetts still is quite alive and active after ten years or more of aerial DDT spraying that

has saved endless stands of trees which otherwise might have been destroyed by insects. Fish and birds still make their homes in the state and probably are blessing the work that has preserved their nesting and food supply.

It should be apparent, however, to commercial sprayers that some concerted action is necessary to equip ourselves with weapons of defense in the dealings with our customers and the general public. We in the profession have not been entirely faultless in this situation. The careless operator who fills streams with DDT, causing fish and bird kill; the enthusiastic pesticide salesman who does not have proper knowledge of his product; and the uniformed applicator who utilizes products unfamiliar to himself or his personnel all have contributed incidents and occasions for the glaring headlines that now face us. Ten dead birds, reported in 40 newspaper articles, become 400 dead birds.

We should include as part of the tools of our trade printed recommendations so readily obtainable to us from colleges, experiment stations, and chemical manufacturers. We should also police, reorganize, and modernize our organizations to deal with the present day criticism of our operations. I would further recommend that more effort be exerted by commercial applicators to cooperate with Audubon groups, conservation people, and garden clubs. Spray programs can be adjusted and a little giving here and there to support wildlife and fish programs may pay off surprisingly well.

Much remains to be lost as a result of the present controversy on the use of pesticides—still more can be gained by a concerted and cooperative effort on the part of not only the conservation and wildlife enthusiasts, but all of us working toward the same goal, a world filled with the gifts of wildlife, food, and forest products and, on the other hand, free of the pests that tend to destroy it all.★★



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AMMONIATOR-GRANULATOR**

This rugged and highly-versatile unit is being used for government research work and experimentation in plant size quantities.

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STAUFFER CHEMICAL Co., New York, has appointed Thomas J. McCaffrey as sales supervisor, Los Angeles area, Agricultural Chemicals Division. He had been administrative assistant to the regional sales manager.

AC

EDWARD R. SCHUMANN, National Plant Food Institute district representative for Minnesota, Wisconsin, and North and South Dakota, has moved his headquarters to 2718 W. 43rd Street, Minneapolis, Minn. He had been located in St. Paul.

AC

C. D. AUSTIN has been named sales training director for the mid-west sales area by the Smith-Douglas Co., Norfolk, Va.

TRACE ELEMENTS

(From Page 47)

Of the elements that usually are classified as trace elements, boron is the only one that has salts soluble in liquid mixed fertilizer containing phosphate. The other usual trace elements — iron, copper, manganese, and zinc — are relatively insoluble.

Two methods are available for incorporating these elements. There is the suspension technique, and use of an agent to complex the element and make it resistant to precipitation by the phosphate.

LIQUID fertilizer producers have not had too much difficulty in making fertilizer-pesticide mixtures. Although there were some initial difficulties, emulsifying agents were soon made available which give a stable, uniform emulsion of almost any toxicant in the various types of liquid fertilizers. The general practice is to mix the pesticide concentrate with the fer-

tilizer in the field rather than at the plant. The concentrate is usually added after the liquid fertilizer is loaded in the tank truck ready for delivery to the farm. Or it can be added to the applicator tank by the farmer. Since only slight agitation is required to form the emulsion, the shaking occurring during hauling is sufficient to give a uniform mix.

This procedure has some advantages over the plant mixing practice in the solid fertilizer industry. One of the major ones is that the type of pesticide and proportion between pesticide and fertilizer can be varied widely to suit specific farm conditions; if the mix is made at the plant, either flexibility is sacrificed or the manufacturer must make and store a variety of mixes.

Another advantage is that the pesticide is sold separately and dumped in after the customer has bought the fertilizer. In most states this has avoided the problems of

additional registrations for fertilizer-pesticide mixtures.★★

*From a paper presented by A. V. Slack, TVA, Wilson Dam, Ala., at the Southern Regional Liquid Fertilizer Conference Feb. 9.

WASHINGTON REPORT

(From Page 73)

chant Marine and Fisheries, and not to the House Agriculture Committee. The Pesticide industry, which has had little contact with the House Merchant Marine and Fisheries Committee, thus might be figured to miss the bill, and the hearings and, in this way, let it go through without being heard.

The real gimmick in the bill is that the Federal agency—in reality—the U. S. Department of Agriculture—does not have to heed the advice of the U. S. Fish and Wildlife Service in carrying out pest control programs. But, and this is a big but, if it does not do so, it would be required under the measure to make a report of what it is doing



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PYROPHYLLITE

Dusts compounded with Glendon's Insecticide Grade Pyrophyllite will not absorb moisture, nor will the carrier separate from the active ingredients during storage. It holds well on plant leaves, even during rain, and when dusted from the air, settles rapidly, minimizing drift.

- pH 6 to 7
- 92 to 95% will pass a 325 mesh screen
- Wt.—32#/cu. ft.
- Aver. particle size below 5 microns
- Chemically inert
- Non-alkaline

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without delay "for referral to the appropriate committees." These would include, of course, the House Merchant Marine and Fisheries Committee.

Pesticide industry leaders who have caught up with this bill indicate it is one to watch.

* * * * *

Pesticide and fertilizer manufacturers will be missing a bet if

they miss the Fifth World Forestry Congress opening in Seattle, Washington, on August 29. Some 2,000 forestry experts from 50 countries are expected to be there.

More important, these experts will be meeting for the first time in the Western Hemisphere to discuss general policies in advancing the practice of forestry throughout the world. With the U.S. now

taking the lead in both fertilization and use of pesticides in forestry, some industry leaders believe this would be a good time to gain world-wide acceptance of these advances in protecting one of the world's greatest natural resources.

They point out that the Congress will give special attention to the multiple use of forest lands for water, wildlife, forage, recreation and timber. Use of pesticides, in particular, figures in all of these categories. Now that insects and diseases are destroying nine times as much timber a year as forest fire, the chances are that pesticides as well as fertilizers will continue to play a greater and greater role in forestry.

The National Plant Food Institute, with its publication on Forest Fertilization Research in the South and its Forest Fertilization Information Clearing House Program, already is well along in a program of providing scientific data upon which to base forest fertilization projects.

* * * * *

Aerial applicators are expected to fly into Washington in sizeable numbers this month for an important May 24 meeting with the Federal Aviation Agency.

At issue is a study paper prepared by FAA on issuing certificates to aerial applicators which meet FAA standards. Some such certification has long been an objective of the National Aviation Trades Association.

Basically, this would mean a kind of licensing of aerial applicators, for every one would have to have an FAA certificate in order to do business. Purpose of the certification would be to assure good operating practices and establish minimum standards of maintenance and of training of aerial applicators and their employees.

Copies of the FAA study paper on certification are being sent to all registered aerial applicators. Their comments are due to be back at FAA by May 17, a

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Why settle for less, when true economy calls for the best? These diluents and dispersing agents enable toxicants to do a better job. With Vanderbilt carriers your dusts and sprays will cling, cover and kill. Get the full facts today — use this handy coupon.



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week prior to the conference in Washington.

* * * * *

National Agricultural Chemicals Association officials have been both surprised and pleased by the popular response to their 1960 release of FDA pesticide tolerances. Over 20,000 copies of the information already have gone to growers organizations, food processors, marketing groups, Land-Grant colleges, and FDA enforcement personnel.

To supplement the list of tolerances, NAC soon will release a compilation of pesticide chemical uses that have been accepted by USDA for registration on a "no residue" or "restrictive labeling" basis. There will be a 50 cent per single copy charge for the new publication.★

TERRE COMPANY

(From Page 35)

samples to the Totowa plant for analysis and recommendations.

Three full-time salesmen cover Terre's territory under the direction of Roy Bossolt, sales manager, who also calls on customers during rush seasons. The company has been owned by the same family since its beginnings and T. A. Terhune, its founder, still is president. O. W. Terhune is secretary and Courtlandt Terhune is treasurer. William Feury is the comptroller.

To assist its dealers, and to keep the Terre name before the public, Terre provides a variety of dealer aid services. The company offers posters for use both outside and inside stores and carries on a continuous campaign with roadside posters and newspaper and radio advertisements. Twenty-seven newspapers in northern New Jersey are included in the program as well as twelve billboards on carefully-selected highway locations. Posters aimed at commuters are placed in 150 strategic spots at railroad stations throughout the area and a local radio station car-

ries the Terre message to 1,100,000 homes.

Terre officials believe that this saturation advertising, plus a reliable product in attractive packages will assure continued growth through sales to the non-farm market.

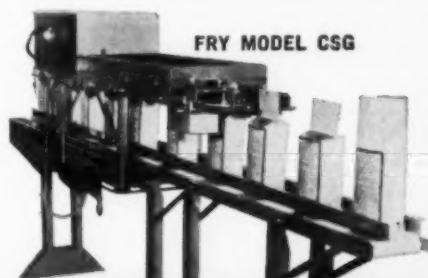
Included in plans for the future, is a consolidation of the company's Rochelle Park plant with the Totowa facilities in a new plant to be constructed on a ten-acre site in Totowa. A decision being faced by the officers of the company, however, is whether to invest in equipment to produce pulverized, granular, or light-weight fertilizers. Present sentiment seems to rule out pulverized fertilizers but the decision still remains to be made between the latter two. Basically, the problem is whether future emphasis will be towards golf courses and parks or towards homeowners. The large turf areas would require granular fertilizers while homeowners prefer light

weight fertilizers. Since it would be impractical to install equipment for both types, company officials are holding up construction of a new plant until a decision is reached. This problem, presumably, is one being faced by similar companies in other suburban areas where the same situation exists and is another in a long series of crises to be faced by companies caught in the middle of changing trends. The companies that come up with the correct answers — as Terre has been doing — will continue to grow with the growing non-farm market.★

GRANULAR PESTICIDES

(From Page 38)

granules in hexagonal fiber drums. Such containers are expensive, but so are the contents. Furthermore, since insecticides are often toxic, it is essential that packages be adequate for safe storage, handling and shipping.



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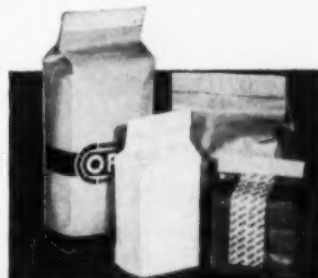
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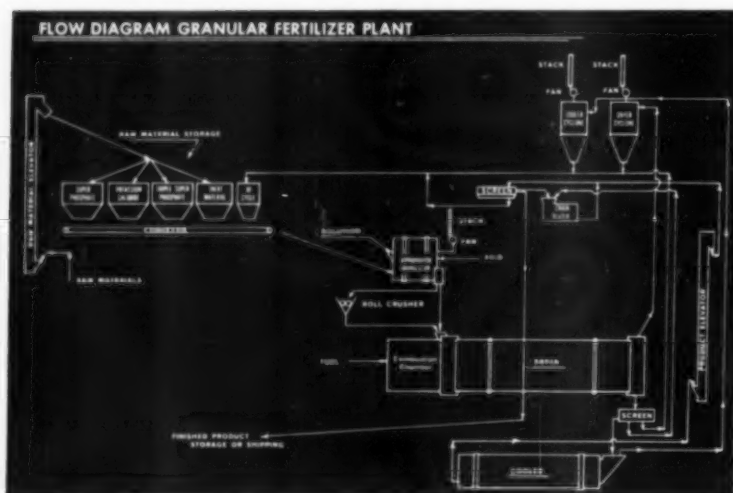
Product labels in all cases we have seen are adequate. One improvement, however, concerns listing the screen mesh size. Our experience indicates this information would help in equipment calibration, more effective use of product, and more satisfied customers. One manufacturer has gone a step further and lists the name of the granular carrier on the container.

After running calibration on commercially available granules

over a period of the past six or seven years, it is our opinion that their quality has steadily increased. Formulations today have less fines and better physical qualities. No doubt one good reason is that today's market potential for granules justifies the capital investment in equipment suited for this type of formulation, while in previous years some formulators "made do" with equipment not specifically designed for this purpose.

The Future of Granular Pesticides

WHAT about the granule of the future? During the past season we have had an opportunity to visit with research groups of many of the basic chemical producers. Some of them are investigating types of granular carriers, other than clays, in an effort to cut down diluent costs and reduce deactivation problems. A very desirable carrier would be one allowing formulation of certain pesticides which at this time are not adapted to granulars because of insolubility, etc. Such a carrier would greatly enlarge the number and variety of granular pesticides available to agricultural producers. It seems reasonable to state that we will have granules of higher quality, with greater flowability, less fines, and of uniform particle size. More activity in the area of granular systemic insecticides is a certainty, and formulation of other insecticide granules will be in the picture as well. Granular soil fungicides are a distinct commercial possibility, while granular soil fumigants are now available in several forms. Granular herbicides have already decreased in price from last season, and with greater volume and more production "know how" it is a good bet that farmers in a year or so will find many of these priced low enough to use on a broadcast basis.★★



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LISTENING POST

(From Page 71)

only sulfur, which is known to be effective against powdery mildews generally, controlled rusty spot. Daines and his colleagues concluded that the evidence that a powdery mildew causes rusty spot is strong, but that more work is needed for definite proof.

Seed Treatment Tests

Laurence H. Purdy has summarized the results of the 1959 regional seed-treatment tests for the control of common bunt (*Tilletia caries* and *Tilletia foetida*)

of winter wheat in the Pacific Northwest (4). In these tests, which up to 1959 had been conducted for 5 years, opportunity is afforded for evaluating the effectiveness of fungicidal seed treatment under the different cultural and environmental conditions of the cooperating States, and for checking the stability of formulation of the materials tested. Results provide a basis for region-wide seed-treatment recommendations. The candidate fungicides are compared with the standard seed-treatment materials, and continued performance equal to, or better than, that of the standards is required to qualify a chemical for recommendation.

In the 1959 tests, results were obtained from seven plots located in Idaho, Montana, Oregon, Utah, and Washington. Results reported from all the locations were similar. Since infection can arise from spores carried on the seed (seed-borne) or from spores in the soil (soil-borne) or from both sources together, the experiment was designed to test all the fungicides against all three possibilities.

The materials tested included 9 mercurials, 8 formulations of hexachlorobenzene (HCB), 2 formulations of pentachloronitrobenzene (PCNB), and 2 experimental non-mercurials. Heavy infection occurred in untreated rows in all plots.

Against seed-borne bunt the mercurials were most effective but all materials, except one of the PCNB formulations which produced only fair results gave good control. On the other hand, only the HCB formulations controlled soil-borne bunt effectively. The ineffectiveness of the mercurials against soil-borne infection was demonstrated again by their performance in the tests for simultaneous control of seed- and soil-borne bunt, in which all formulations of HCB and one formulation of PCNB provided good control but all the other materials gave only fair or poor results.

Control of Cone Rust

Control of southern cone rust on slash pine is necessary because southern cone rust (*cronartium strobilinum*) destroys the cones and therefore the seed of slash and longleaf pines (*Pinus elliotii* and *Pinus palustris*). According to Otis C. Maloy and Frederick R. Matthews (2), of the United States Department of Agriculture, Forest Service, demand for slash pine seed has been increasing and cone rust has become a serious problem in production. The cone rust, like many other rusts, requires two different kinds of host plants to complete its development. The hosts for the alternate stage of the cone rust are various kinds of evergreen oaks. A survey to determine its distribution showed cone rust to be most prevalent and severe within the range of the live oak (*Quercus virginiana*) in Florida and southern Georgia. The transition between abundant and slight attack was rather abrupt and practically coincident with the northern limit of live oak. Therefore Maloy and Matthews suggested that new slash pine seed plantations should be established north of the range of this most important alternate host. For already existing slash pine plantations within the live oak range, however, measures to protect seed production against the rust are necessary. Of several chemicals applied as sprays to developing cones ferric dimethyldithiocarbamate (ferbam) gave best results.★

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- (4) Purdy, Laurence H. 1960. Results of regional seed-treatment tests for the control of seed-borne and soil-borne common bunt of winter wheat in the Pacific Northwest,

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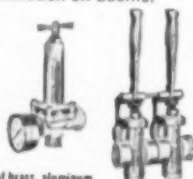
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1959. Plant Disease Repr. 44: 25-28.

- (5) Winstead, N. N., and H. R. Garriss. 1960. Control of cabbage clubroot in North Carolina. Plant Disease Repr. 44: 14-18.

SPRAYING IN ENGLAND

(From Page 61)

treated from the air, especially where insect or fungal attack can be sudden or expands swiftly. Timing is important for the control of potato blight and of celery leaf spot. There also may be a future for spraying against apple scab from the air.

But, so far, extensive aerial spraying has not caught on in Britain, and aircraft operators cannot stay in business on any large scale unless they lengthen the annual flying time of their aircraft by arranging to carry out a large proportion of their work abroad. Fison-Airwork does 90 percent of its spraying overseas; the proportion for Crop Culture is about half and half. Other U.K. based air spray operators either contract for work themselves or contract their aircraft out of season to other firms with overseas commitments.

Though aerial spraying in Britain is likely to expand, expansion will come slowly, for the operator has many physical disadvantages. Fields are small, many are 10 acres or less in size, and most lie in the 10 to 20 acre bracket. In eastern England, and on the downlands, of the South, fields are much larger but otherwise improved conditions are frequently marred by additional obstacles such as high hedges, trees, buildings and electric pylons—for this is a crowded island. Suitable landing strips are not always easy to find near the site of work, not least because so many farms carry livestock, which may be occupying some of the best sites.

Small fields make helicopters the most suitable farming planes from a technical point of view, but their high initial cost puts depreciation and flying cost per hour

above that of the fixed wing types. Here is the British operator's dilemma. But even when he has chosen the equipment that is the most suitable for his own conditions he cannot expect to treat more than an average of 30 to 40 acres an hour, against three or four times these figures in overseas plantations work. The weather in Britain also cuts down work capacity to perhaps a quarter of that achievable on contracts outside the country.

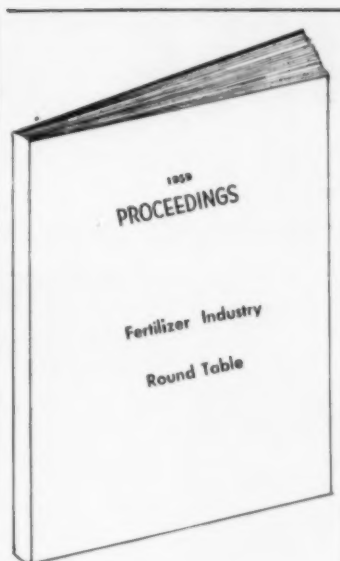
The operator also is hampered by regulations which, if rigidly enforced, would make agricultural spraying impossible. It is still illegal to fly at under 500 feet in the United Kingdom, but flying below this height for agricultural purposes usually is ignored. However, there remains the danger that any occupier of a "settlement" may make a complaint. This quaint phraseology means that operators are always in danger, and the pilots suffer most because it is their flying licenses that will be taken away if an offense is committed.

There is at present a move to establish a voluntary code of conduct for farm spraying pilots, worked out in conjunction with the Government. If this can be agreed it would remove the necessity for new legislation—which might result in restrictions and difficulties for spray contractors. This code is likely to involve special concessions from existing flying regulations for agricultural pilots, so long as they satisfied the Ministry of Agriculture that they had suitable qualifications as farming fliers. Such a move would certainly help to put farm flying in Britain on the road to further expansion.★

PEST ROUNDUP

(From Page 66)

lina was 861 compared with 1,318 entering hibernation and 699 found a year ago. Comparable counts in the Coastal Plain area of



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AGRICULTURAL CHEMICALS

North and South Carolina were 1,049, 5,082, and 1,963. Counts in the Piedmont area of North and South Carolina were 590, 4,383, and 242. Three hundred and seventy-seven live weevils per acre of trash were found in the north central North Carolina area during the 1960 survival survey, compared with 834 going into hibernation and 81 in the 1959 survival survey.

In Florence County, South Carolina, the average number of live weevils per acre found this spring was 1,560 out of 5,434 per acre entering hibernation. This survival of 28.7 percent is approximately 50 percent less than the average of the 17 years for which fall and spring surface woods trash examinations have been made at this station. Since 1947 only in 1952, 1957 and 1958 have fewer surviving weevils been found than at this time.

Hibernation counts were made in the central Texas Counties of Falls, Hill, Limestone, and McLennan for the first time in the fall of 1959. It was found that there was an average of 6,631 live boll weevils entering hibernation per acre of woods trash. Recent collections from essentially the same areas revealed an average survival of 2,065 weevils per acre. Comparative figures for this method of determining hibernation information are not available for previous years in the Texas area.★

NIAGARA DIVISION

(From Page 33)

method of merchandising, the Department believes, has been highly successful to date.

FMC has carried its flexible approach to all its operating problems right through to the research department. Recognizing that there are both advantages and disadvantages to completely centralized research, they have solved the problem by maintaining facilities for both centralized and specialized research. Long-term chemical

research is centralized, and is carried out primarily in a central research center at Princeton, N. J.

Research work that is obviously the concern of a single division is carried out by that division. In the case of the Niagara division, specific research on pesticides is carried out at Middleport and at branch laboratories at Jackson, Miss., and Richmond, California under the direction of Dr. Robert L. Gates. It is this work that has resulted in development of some of the numerous new products that are building sales totals for the Niagara division. The entire FMC budget for research runs \$6.5 million a year. About \$2 million of this is spent on centralized research and the balance by the separate divisions.

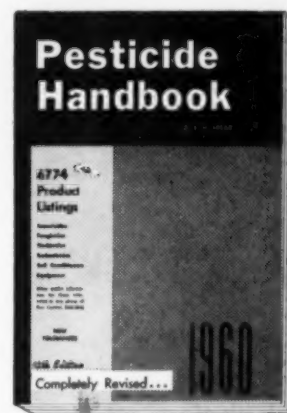
The Niagara research department is operated for the support of all three of the marketing departments. One segment of the department has responsibility for proving new products in the field. This includes the conduct of experimental work on Niagara's own farms, as well as contacting Federal and State research workers who may have an interest in new Niagara pesticides. A field development staff of fourteen is now engaged in this work. Standard company policy is to field test new candidate pesticides on their own land first, before taking such new products to the Experiment Stations. Thus they are armed with prior knowledge of field performance.

Products currently showing most promise for the future are a group of anilide herbicides. Dicryl, one of these, is believed to be the first post-emergence herbicide for use in cotton. It will be tested extensively in 1960, and will be available on a limited sales basis. The Niagara research department is anxious to get a substantial volume of test results on this new product during the 1960 season in a variety of different farm situations. Solan, a post-emergent herbicide for use on tomatoes, will also be under test this season. Karsil, another

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about the editor —

Dr. Donald E. H. Frear, Editor of *PESTICIDE HANDBOOK 1960*, is one of the leading authorities on the chemistry of pesticides. He is the author of "Chemistry of Insecticides and Fungicides," the first book dealing with this subject published in the United States. In addition he has written several other books, including "Chemistry of Insecticides, Fungicides, and Herbicides." Dr. Frear is Professor of Agricultural and Biological Chemistry at The Pennsylvania State University.

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post-emergent product, has shown some promise on carrots and celery, but in view of the high cost of chronic toxicity studies it is still uncertain at this time whether it will ever reach the commercial stage.

Another new herbicide, currently designated as Niagara 5996, is a substituted benzonitrile. Also designed for pre-emergence use, it will be field tested in Niagara's 1960 research program. Additional materials in the laboratory stage under test include soil fungicides, repellents and synergists. There are other promising new insecticides in the Niagara arsenal, Dr. Gates indicated.

In the Niagara scheme of doing things the research department has complete responsibility for new products, all the way down the line from initial screening and synthesis, through the various testing stages and including the job of securing registration and state and federal approval for use.

Until recently the Niagara name has been prominent primarily in the field of insecticides and fungicides. Now, however, the promising new herbicides point to a bigger interest in and share in this market for the future. There seems to be a possibility too, of further expansion in FMC's operations in the fertilizer field. The company makes ammonia at its South Charleston plant, but essentially all of it is used within the organization. The Mineral Products Division, which along with the Chlor-Alkali Division, came to FMC as a part of the Westvaco purchase, is also a basic producer of furnace grade phosphoric acid at its works at Pocatello, Idaho.

We get the impression in talking to FMC's management that the company is taking a long, searching look at the dramatically expanding fertilizer business in the United States, and that over the next ten years the FMC name could become better known in this field.★★

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Box 283

c/o Agricultural Chemicals
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SALESMAN; old established manufacturer agricultural insecticides, fertilizers. Territory — New England, New York, Pennsylvania. Opportunity for advancement. Experience and technical background desirable. Box 280, c/o Agricultural Chemicals.

Chemist—experienced in formulations and quality control of Insecticides, Fungicides and Herbicides. Well established manufacturer located and operating in the Middle Atlantic area has need for two chemists in its current expansion program. Send letter stating training, experience and salary expected to Box 281.

FOR SALE: 1 — Sprout Waldron UNUSED 335 cu. ft. ribbon mixer, 50 cu. ft. ribbon mixer. 2—Robinson 125 cu. ft. ribbon mixers. UN-USED #9 Sturtevant rotary blender, 150 cu. ft. T304 st. st. dry material handling system including: 1800 cu. ft. weigh hoppers; AJAX "Lo-veyor" shaker conveyors, bucket elevators, screw conveyors, all st. st. Send for Details. **PERRY EQUIPMENT CORP.**
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DR. WALTER F. SOWELL has been named soils specialist for the Auburn University Extension Service. He joined the extension staff Jan. 1.

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Rotary dryer 7' x 60', 2 tires, 1/2" shell, complete with drive, motor, blowers and all auxiliary equipment
Rotary dryer 6' x 64', 2 tires, 1/2" shell, complete with drive, motor, blowers and all auxiliary equipment
Rotary dryer 6' x 50', 2 tires, 1/2" shell, complete with drive, motor, blowers and all auxiliary equipment
Rotary dryer 6' x 35', 2 tires, 1/2" shell, complete with drive, motor, blowers and all auxiliary equipment
Rotary dryer 4' x 20', 2 tires, 1/2" shell, complete with drive, motor, blowers and all auxiliary equipment

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OXford 7-9493

PYRETHRUM is expected to be a far larger crop this year than last, according to the Pyrethrum Board of Kenya. Estimates for the 1960 crop are that it will be one-third larger than in 1959, in spite of adverse weather.

AC

CLUPAK extensible paper has entered the European market with the start of full-scale production by Dynas Aktiebolag in Sweden. Under license from Clupak, Inc., New York, Dynas is producing the extensible kraft paper on a J. H. Voith Fourdrinier machine at its mill in Vaja, Sweden.

AC

THE SOIL Conservation Society of America's 15th annual meeting will be held at Ontario Agricultural College, Guelph, Ontario, August 28 to 31. This will be the first time the society has met in Canada.

AC

RICHARD J. HEFLER, vice president, finance, of American Potash & Chemical Corp., Los Angeles, has been elected to the company's board of directors.

AC

FOOD MACHINERY & CHEMICAL CORP., New York, has appointed Ralph Bloom Jr. as Washington, D.C., representative for the chemical division. He replaces Philip H. Groggins, who now is senior scientific advisor for the company.

PRODUCTION ROUNDTABLE

(From Page 52)

handle raw materials with maximum input sizes of $\frac{3}{4}$ ", 1" and $1\frac{1}{2}$ " respectively. Capacity ranges from 2,000 lbs/hour to 150,000 lbs/hour.

RESIDUE SYMPOSIUM

(From Page 49)

plication methods and materials that will leave no residues. He said that there is a need to determine entry, accumulation, and action of residues in plants so that application methods can be worked out to reduce the residues. Also, he

said, we need more precise determination of the fate of chemicals.

Most fatal accidents caused by pesticides still involve materials older than DDT and over half of the victims are children, according to Dr. W. J. Hayes, Jr., communicable disease center, U. S. Public Health Service, Savannah, Ga. Dr. Hayes pointed out that both the kind of compounds involved and the incidence of injury to children indicate that the situation is improving and would improve much faster if it were not for carelessness on the part of consumers. Nothing is now known, he said, to justify the belief that pesticides are a threat to human health.

If people in the pesticide industry can stand exposure to DDT for many years and accumulate as much as 300 ppm in body fat without ill effects, he said, I believe that the rest of us can live for a lifetime without worrying about the amount of DDT ingested in everyday activity. In tests of pesticide plant personnel, Dr. Hayes said that his department has found that over half of the people in formulating plants average 350 ppm of DDT in fat and one plant operator stored as much as 600 ppm without ill effects.

The problem in the use of insecticides to protect stored grains, fruits, and vegetables, according to Dr. Lyman Henderson, Market Quality Research Division, ARS, Beltsville, is the delicate balance between keeping food free of insects and at the same time free from chemicals. Other problems occur in cases where commodities are kept in storage for a long period of time and require repeated fumigations that may cause a build-up in residue, and the increase in the use of flat storage for grain where variations in aeration systems cause difficulty in the even distribution of fumigants.

Dr. Henderson's division currently is studying food packages in seeking a solution to the problem with an eye towards wrappers that cannot be eaten through or the

addition of pesticides or repellents to the wrappers. It doesn't do a manufacturer any good, he pointed out, to insure that food is free from infestation when packaged if it picks up infestation from rail cars or warehouses after leaving his plant.

The vast majority of livestock losses traced to pesticides are due to misuse and failure to read labels, according to Dr. R. D. Radeleff, Animal Disease and Parasitic Division, ARS, Kerrville, Texas. He said that more than 90 per cent of injuries are due to carelessness or the leaving of materials in places to which animals have access.

The residues of insecticides used on feed and forage according to directions, Dr. Radeleff said, have not produced poisoning in livestock because of the precise recommendations that followed careful study by the U. S. Department of Agriculture and industry and state experiment laboratories. As far as direct toxicity of pesticides to animals is concerned, said Dr. Radeleff, precautions are needed. He pointed out that adequate testing is being done on livestock products. For instance, in 1959, only ten of 3,000 products offered for testing were recommended for use on livestock.★

EDITORIALS

(From Page 29)

ventions with two or three of his subordinates, as a way of relieving himself of some of the physical burden and conditioning his associates for the job of assuming company operation after same busy executive finally admits he can't last forever.

One way might be for the company president to bring along one or two of his key associates for a year or two, until they feel at home, then slide out of the picture himself. A dramatic alternative, followed by the dynamic executive, is to do the whole job himself without any help, including the final heart attack.★

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TALE ENDS

NAC has in preparation a booklet compiling pesticide chemical uses that have been accepted by the Pesticide Regulation Branch, USDA, for registration on a "no residue" basis. The publication will list the pesticide chemical and maximum dosage for specific crops that would normally result in no residues remaining on the crop at harvest. Orders are being taken now at 50 cents a copy.

Advance word on the program for the coming NPFI meeting to be held June 13-15 at the Greenbrier Hotel, gives every indication of it being more than usually interesting. This year's discussions will include a full session on fertilizer technology, and fertilizer manufacturers will have an opportunity to bring production as well as sales questions up for review.

Promoting the use of television to advertise agricultural products to the consumer, CBS Television studies have issued some nine booklets reviewing case histories of how agricultural advertisers have used television "spots." Allied Chemical's program on Arcadian Nitrogen Solutions is featured in one of the brochures, while Dow Chemical's use of spot television to advertise Dowfume D-C 2 is another of the stories. The booklets may be obtained by writing to CBS Television Spot, New York City.

AC

It is refreshing to see that several other people recognized the half-truths in William Longgood's book, "The Poison's in Your Food."

The book was reviewed by Milton Viorst in the *Washington Post*, who made the comment that Mr. Longgood has "turned out a fast-moving sensational reader. But he has failed to give an honest report on the meaning of food chemicals, and what is being done about them."

AC

A group of Russian fertilizer and insecticide experts are expected to visit the U. S. for a 20-day tour in June. The Russians will visit USDA and State Experiment Station facilities, and the TVA. To judge from reports emanating from behind the "iron curtain," the visitors can be expected to take voluminous notebooks back home with them when they leave. Stories out of Poland, Red China, and the USSR, itself, indicate that this season's crop prospects are very bleak indeed. In Poland, the government is publicly placing the blame for the dismal outlook on the fertilizer industry for not having produced the quantity or quality of plant food required.

AC

Olin Mathieson are planning elaborate "start-up" ceremonies early in May at their new high-analysis fertilizer plant in Pasadena Texas. The plant is designed to produce some 500,000,000 tons of pelletized fertilizer a year, — and production will be underway by the middle of May. Grades as high as 16-48-0 will be produced. More details on this plant next month.

AC

In what may have been a surprise to him, Secretary of Agriculture Ezra Taft Benson, last month received posies instead of the usual brickbats from Senators reviewing his agency's spending. "You are to be commended, Mr. Secretary, for what you have done for agricultural research," Senator Russell (D. Ga.) told him. "Farm research," Senator Russell said, "has kept the farm in business." The Senator is chairman of a Senate appropriations subcommittee which heard testimony April 26 from Secretary Benson on a budget calling for nearly \$6,000,000,000 for the USDA for 1961.

A TYPICAL AGRICULTURAL CHEMICALS SUBSCRIBER SAYS

"I read Agricultural Chemicals



AUGUST A. PETRUS
Cotton States Chemical Co.
West Monroe, La.

because . . .

Agricultural Chemicals contains many articles that deal with the problems of formulators, and, in which we are, of course, most interested. In addition, many valuable facts are contained throughout the magazine that help to keep us up to date with the rest of the industry. The employees in our plant also are regular readers of AGRICULTURAL CHEMICALS.

Cotton States Chemical Co., an affiliate of Tyner-Petrus Co., is one of the biggest and best known formulators of fungicides and agricultural pesticides in the south. The plant and main office are located in West Monroe, La.

One of the first pesticide formulators to get into the "cotton poison" business in a big way, Cotton States Chemical is a well known name in the field. Very active head of the company is "Pete" Petrus, a familiar face at NAC meetings and a board member of NAC.

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"creative progress in processing
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John A. Rodda (right), general manager of Fairfield Chemicals, accepts Canner Packer Magazine's Gold Medal Award. Thomas Vought, representing the magazine, makes the presentation.

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We at Fairfield feel that the citation speaks for itself: "Awarded for outstanding innovations or improvements in equipment or supplies used by processors of food."

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